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A

PRACTICAL TREATISE

ON THE

DISEASES OF THE TESTIS,

AND OF THE

SPERMATIC CORD AND SCROTUM.

WITH NUMEROUS WOOD ENGRAVINGS.

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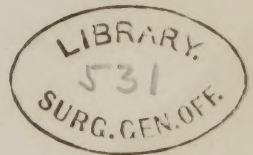
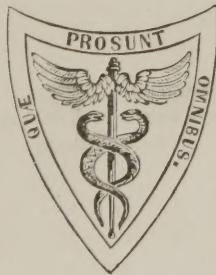
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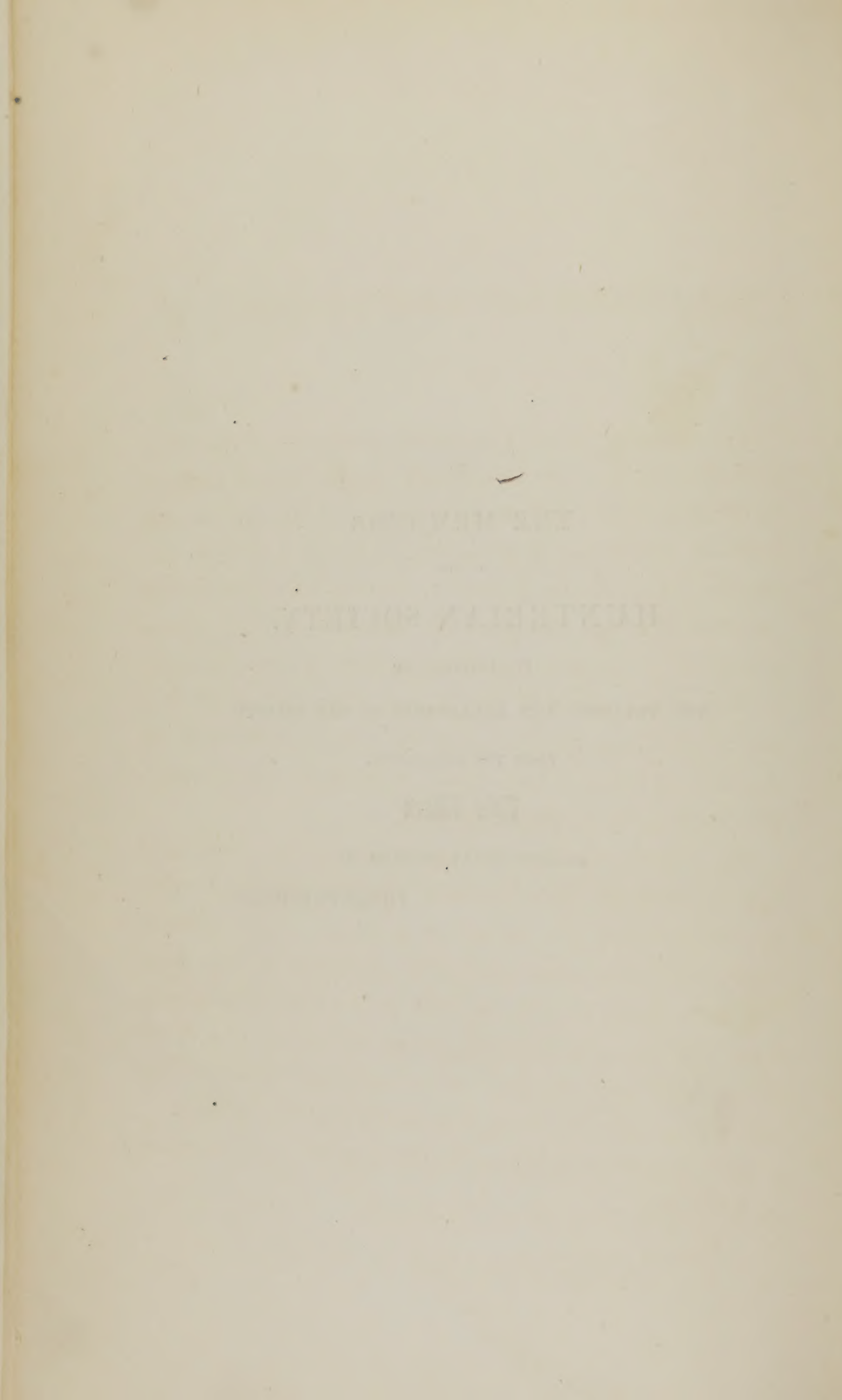
TO
THE MEMBERS
OF THE
HUNTERIAN SOCIETY,

IN TESTIMONY OF
THE PLEASURE AND ADVANTAGES HE HAS DERIVED
FROM THE ASSOCIATION,

This Work

IS RESPECTFULLY INSCRIBED BY

THEIR PRESIDENT.



PUBLISHERS' ADVERTISEMENT.

THE completeness of the present work, and the thorough revision which it has so recently enjoyed at the hands of its distinguished author, have rendered superfluous any material additions in presenting it to the American profession. DR. W. H. GOBRECHT, who has superintended its progress through the press, has therefore only introduced a number of illustrative engravings, and a case of interest. A few of the notes of the former editor, DR. P. B. GODDARD, have been retained, and the cases comprised in the Author's Appendix have been incorporated in their appropriate places throughout the text.

MR. CURLING in his Preface alludes to the omission of the Anatomical Introduction of the first edition, in order to accommodate his numerous additions. By a different typographical arrangement of the American edition, space has been found for this valuable section without enlarging unduly the size of the work, and accordingly such portions of it have been retained, as had not been introduced by the author in various chapters throughout the volume.

The American additions are distinguished by enclosure in brackets.

PHILADELPHIA,
April, 1856.

PREFACE

TO THE SECOND EDITION.

MORE than twelve years have elapsed since the publication of the first edition of this work. During that period, I have continued my inquiries into the morbid changes which occur in the testicle, and have availed myself of increased opportunities of studying its diseases. In this edition, some new chapters have been added; many have been rewritten or altered; and, it is hoped, that nearly all of them contain additional facts of practical interest and importance. By omitting the anatomy, which formed the introductory part of the first edition,¹ and by careful conciseness in the description of cases, I have been able to embody a great deal of fresh matter, and to add several new wood engravings without enlargement of the volume.

The names of many friends to whom I am indebted for valuable information, and opportunities of observation, will be found mentioned in the following pages. I must here express my acknowledgments to Professor Quekett and Dr. Andrew Clark for assistance in the microscopic examination of the morbid tissues.

The Jacksonian Prize for 1853 was awarded by the

¹ See American Publishers' Advertisement.

Council of the Royal College of Surgeons to Mr. Harvey Ludlow for an Essay on the Diseases of the Testis. This young and promising surgeon joined the staff of civil surgeons despatched to the seat of war in the East, and in the spring of this year unfortunately died of fever at Scutari. In the month of July last, when this edition was nearly ready for the press, the manuscript copy of Mr. H. Ludlow's Essay, together with some beautiful drawings illustrating it, was liberally placed by his father at my disposal. Several cases of interest well observed, and recorded in the Essay, will be found incorporated in this work.

39 GROSVENOR STREET,
December, 1855.

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A PRACTICAL TREATISE

ON THE

DISEASES OF THE TESTIS,

ETC.

ANATOMICAL INTRODUCTION.

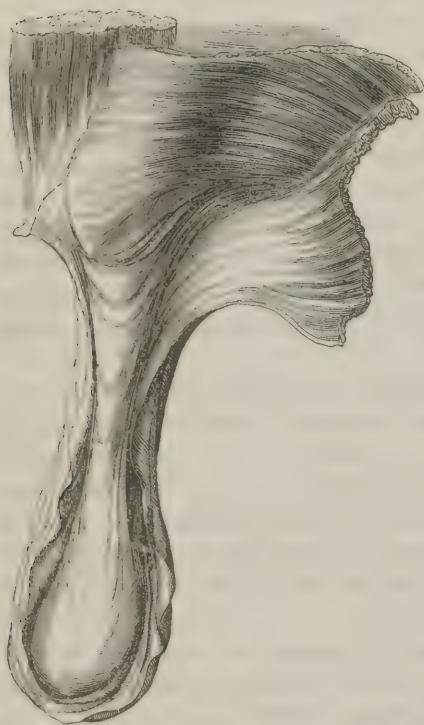
THE SCROTUM.

THE scrotum is a pouch, formed of the common integuments, for the reception of the testicles. It is evenly divided externally into two halves by a prominent ridge, a continuation of the raphé, from the under part of the penis to the perineum. The skin of the scrotum is thin, like that of the penis and eyelids, and browner than in most other parts; in some individuals a coloring matter, similar to that which occurs in the skin of the negro, may be perceived beneath the cuticle. It is abundantly supplied with sebaceous follicles; and short hairs, obliquely inserted, are thinly scattered over its surface. It is very loose and extensible, a fact which is often witnessed in connection with scrotal hernia, and various chronic enlargements of the testis. When corrugated, it is thrown into numerous folds or rugæ, running at right angles with the raphé, which give it a wrinkled appearance and greatly diminish its size.

Immediately beneath the skin, there is a thin layer of contractile tissue of a reddish-gray color, termed the *dartos*, which is so intimately connected with the inner surface of the common integument, that their separation is difficult, and the one follows the movements of the other. The dartos has been carefully examined by Mr. Bowman, who considers it to be muscular, and composed of

the rectus muscle, by fasciculi partly tendinous and partly muscular. From these two attachments flat and slender bands of thin and

Fig. 1.



very pale muscular fibres descend at the sides, in front, and often at the back of the cord, and form a successive series of curves or loops of various sizes and lengths, which increase as they descend. The lower loops spread out, and are intimately connected with a thin aponeurotic or fibro-tendinous structure, which invests the tunica vaginalis, and is attached to the posterior edge of the testis and lower part of the vas deferens. This muscle is abundantly supplied with nerves, branches of the external spermatic.

The development of the cremaster muscle varies

considerably in different individuals and at different ages. It is very distinct in adults of muscular frame, and remarkably so in certain cases of hernia and hydrocele, when its fibres are hypertrophied. Previous to puberty it is small and indistinct; and in persons much emaciated by disease or advanced in age, its arches are so thin and pale as scarcely to be discerned. The actions of the cremaster, which, with a few exceptions, are involuntary, appear to be those of giving a tonic support to the testicles, retracting them to the abdominal rings, and compressing them during the sexual act. In some instances in boys before the approach of puberty, this muscle has been capable of drawing the gland up into the inguinal canal. Persons are occasionally met with who possess a voluntary power over its actions in various degrees of perfection. Some are able to

elevate the testicle on one side but not on the other; whilst others can retract both testicles to the abdominal ring, and retain them there at will. A very remarkable instance of the cremaster muscle being completely under the influence of volition, is recorded by Mr. A. C. Hutchinson. It was the case of a sailor, who availed himself of it to cause tumors in the groins which simulated hernia, in order to avoid impressment in the king's service. On being detected, he displayed several remarkable feats of the power he possessed over these organs. He pulled both testes from the bottom of the scrotum up to the external abdominal rings with considerable force, and again dropped them into their proper places with singular facility. He then pulled up one testis, and, after some pause, the other followed, as the word of command was given; he then let them both drop into the scrotum simultaneously. He also pulled one gradually up, whilst the other was as gently descending; and he repeated this latter experiment as rapidly as the eye could well follow the elevation and descent of the organs.¹

THE TESTIS.

The testes are universally known as the glands by which the semen or spermatic fluid is secreted: contained within the scrotum, they are suspended at a variable and unequal distance from the abdominal rings, one testis, generally the left, hanging a little lower than the other. This arrangement prevents any collision between these organs when the thighs are suddenly approximated; one testicle slipping above the other, and thus eluding violence. In cases of transposition of the viscera and bloodvessels, it has been observed that the right testicle hangs lower than the left.

The shape of the testis of an adult is that of an oval with flattened sides. The organ has two extremities, an antero-superior and a postero-inferior; two edges, an antero-inferior and a postero-superior; and two lateral surfaces. Its position in relation to the body is rather oblique, its long axis or antero-posterior diameter passing from above downwards and a little inwards. Its edges and sides are convex. Its upper extremity is rounded and capped by the epididymis, which rises above the body of the gland like the

¹ Practical Observations in Surgery, 2d edit. p. 186.

crest on a helmet. The mean dimensions of the testis are one inch and three-quarters in length, one inch and a quarter across or in breadth, and one inch in thickness or from side to side.¹ Meckel states its average weight to be four drachms, and Sir A. Cooper about an ounce. I have found the mean of these two estimates, viz., six drachms, to be the ordinary weight of the sound testis of a healthy adult. There are few organs subject to greater variations in size and weight than the testis, even in men of the same age and constitution. The testicles also of the same individual rarely agree, the volume and weight of the left testis being in general greater than those of the right. I weighed the testicles of six men, two of whom were killed by violence, and found the left gland heavier than the right in five; in neither of these instances, however, was the difference more than a drachm. The organ feels tense, compact, and slightly elastic. Its degree of consistence depends more on the tension of the tunica albuginea than on the proper substance of the gland, but it is a good deal influenced by the quantity of seminal fluid contained in the tubular structure, and its state of activity or rest; the gland being tense and tumid when the organ is exercised and the tubuli are distended, and soft and flaccid when they are empty and the gland inactive.

The parts composing the testis may be described under four heads:—I. The Protective Parts or Tunics; II. The Proper Glandular or Secreting Structure; III. The Excretory Parts; IV. The Vessels and Nerves.

I. THE PROTECTIVE PARTS OR TUNICS.

The Tunica Vaginalis.—This is a delicate serous membrane in the form of a shut sac, which consists of two portions; an outer one, free and loose, and an inner, reflected, or testicular portion, which closely invests the gland. Sir A. Cooper designates the loose portion the *tunica vaginalis reflexa*. In accordance, however, with the analogies afforded by the other serous pouches, I have termed the testicular the reflected portion of the membrane. In speaking, therefore, of the tunica vaginalis, without the addition of

¹ According to Cruveilhier, the testis measures two inches in length, one inch in breadth, and three lines in thickness. Sir A. Cooper makes its long diameter two inches, its transverse an inch and a half, and its lateral one inch and one-eighth.

the term reflected or testicular, it will be understood that I mean to imply the outer and loose portion. The two portions are connected and continuous with each other. The outer one loosely invests the whole of the testis, except its posterior edge and inferior extremity, parts where it becomes attached to the gland. It is connected with the testis at about five lines from the lower extremity, and the junction of the two portions is marked by a white and rather irregular line. The uncovered portion of the testis corresponds to the original attachment of the gubernaculum. On the inner side of the gland the membrane, after investing the lower part of the cord to a greater or less extent, is reflected to the epididymis just below its head, and to the posterior edge of the body of the testis, being there separated from the epididymis by the vas deferens and blood-vessels of the gland. On the outer side the membrane entirely covers and closely invests the epididymis, and forms a cul-de-sac, which isolates its middle from the posterior border of the testis, and in cases of hydrocele is often distended into a good-sized pouch. At the bottom of this sac the tunica vaginalis on the two sides comes into close contact, and sometimes there is a communication at this spot between the two. The smooth and polished surface of the shut sac thus formed by the tunica vaginalis is lubricated by a halitus, which, when condensed, forms a serum, having the ordinary properties of the secretions of the other serous membranes. The office of this membrane is to facilitate the movements of the testis, so as to enable it to elude pressure and escape violence.

In some adult subjects the tunica vaginalis, which was originally a process from the serous lining of the abdomen, still retains its connection with that cavity. When the communication is free, the sac is very liable to receive a protrusion of some of the contents of the abdomen, and become the seat of congenital hernia. Sometimes the communication continues through a contracted tubular canal, which, though too narrow to admit the transit of any of the viscera, is open to the passage of fluid. In other cases the obliteration is partial, one or more isolated serous sacs being left along the cord. It more often happens, however, that after the upper aperture of this process has closed, a considerable part of it below remains unobliterated, so that the tunica vaginalis extends for some distance upwards in front of the cord. Frequently, also, although the obliteration is complete, remains of the prolonga-

tion may still be found in the form of a slender whitish filament, or fibro-cellular process, which is lost in the cellular tissue in the anterior part of the cord, but may sometimes be traced as far as the tunica vaginalis.

A small body of an irregular shape and variable size, and of a pale red or pinkish hue, is commonly found attached either to the upper extremity of the testis, or at the angle where the tunica vaginalis passes from the body of the gland to the epididymis. It is composed of a duplicature of this membrane, containing some fine cellular tissue and a number of small vessels. I have seen this little body in the testis of the fœtus whilst in the abdomen; and in early life it is often of proportionally larger size, and of a deeper red color than in the adult. It is quite distinct from the pedunculated cysts often found attached to the head of the epididymis. This little appendage to the tunica vaginalis seems to correspond with, and to be a type of, the remarkable omental process attached to the superior part of the testis in the *Rodentia* and other animals. That it is an unimportant structure in the adult is shown by its being frequently wanting.

Tunica Albuginea or *Tunica Propria* is a dense, resisting, inelastic membrane, composed of fibrous tissue analogous to the sclerotic coat of the eye. It completely invests the body of the testis, but not the epididymis. Its external surface is covered by the tunica vaginalis reflexa, to which it intimately adheres. This tunic is divisible into two layers, which can only be separated by a tedious dissection, but which in certain animals may be detached without difficulty. The branches of the spermatic artery and veins ramify in the substance of the tunica albuginea, in canals bearing in their arrangement some analogy to the sinuses of the dura mater; which membrane the outer layer is supposed to resemble. The smaller vessels are chiefly distributed on the inner layer, which, owing to its vascularity, has been compared to the pia mater investing the brain. At the postero-superior border of the testicle, and a little to its outer side, the tunica albuginea forms an internal projecting body or process, which lodges the blood-vessels, and a portion of the glandular structure of the testicle called the *rete testis*. This body is named after the anatomist who first described it the *Corpus Highmori*. It has since, however, been called by Sir A. Cooper the *mediastinum testis*, and he describes it as being formed by the

tunica albuginea, which at that part is divisible into three layers. The first layer turns upon the spermatic cord, and unites with the sheath which covers the vessels. The second layer unites with a similar layer on the opposite side, and forms a thick substance, between the fibres of which interstices are left for bloodvessels and absorbents; whilst the internal layer, uniting with that on the opposite side, as well as with the preceding layer of the tunica albuginea, forms the process called mediastinum, which projects into the testis between the tubuli; and it is in this substance that the seminal canals of the rete are placed. The mediastinum is therefore composed of two bodies; the upper placed towards the spermatic cord, the lower towards the centre of the testis; in the upper are placed bloodvessels; in the lower the canals of the rete. Its length varies from six to eleven lines.

II. GLANDULAR OR SECRETING STRUCTURE.

The glandular part of the testis is very simple, and more easily demonstrated than the glandular structure of most other organs. It consists of numerous seminiferous vessels or tubes, supplied with bloodvessels, lymphatics, and nerves. Its color is a grayish-yellow or brown, more or less tinged with blood, and is paler in infants and old men than in adults. The tubes are collected into numerous lobes or lobules, invested by a fine cellular tissue, which, detached from the interior of the tunica albuginea penetrates the gland, and sends out lateral processes forming septa, which separate and sustain the lobules. These septa at their origin partake of the fibrous character of the tunica albuginea, but as they converge towards the superior border of the testis, occupied by the corpus Highmori, they become finer, and are gradually resolved into a delicate cellular tissue. The septa are traversed by numerous bloodvessels which minutely divide in them before being distributed on the seminiferous tubes.¹

¹ Sir A. Cooper states, that the inverted portion of the tunica albuginea, forming the mediastinum testis, sends forth numerous ligamentous cords, some of which pass to the anterior edge of the testis; whilst others form shorter processes to support and invest the lobes, being met by similar ligamentous cords from the inner surface of the tunica albuginea. I have not been able to make out any such ligamentous processes, passing into the substance of the testis, as are represented in Sir A. Cooper's work (part i, pl. 2, fig. 3), which I have found to be an exaggerated view of the preparation

Tubuli Seminiferi.—These tubes, which form by far the bulk of the glandular structure of the testis, are very numerous, and radiate from all parts of the circumference of the organ towards the mediastinum, making numberless convolutions, which progressively diminish as they approach the rete testis. Two or more of the tubuli being collected together, and invested by a common cellular tunic, form a lobe or lobule of a conical form, its apex terminating at the corpus Highmori. The lobes thus formed are not entirely distinct, but communicate with neighboring lobes; the processes investing them are therefore incomplete, and the lobes cannot be separated from each other without division of some of the seminiferous tubuli. Krause estimates the number of the lobes as varying from 404 to 484.¹ The tubuli are of a white color and uniform size, but their calibre differs in different subjects, and varies a good deal according to the age of the subject and the state of activity of the testes, being larger in young adults and when distended with semen than in old persons and when the gland is in a state of rest.² The size of the ducts also often differs in the two from which it was taken. The cords described appear to me to consist chiefly of bloodvessels supported by slight fibrous processes from the tunica albuginea and cellular tissue. In a well-injected testis very little tissue of the nature of ligament can be found between the lobes.

¹ Müller, Archiv. für Anatomie, 1837, p. 22.

² The following is from a Table of Measurements of the Seminal Tubes made by Mr. Gulliver. (*Proceedings of the Zoological Society, July 26, 1842.*)

Age.	Size of Tubes in Fractions of an English Inch.	State of Testes.
22	1-142 to 1-77	Scarcely any fluid in testes. Died of phthisis.
42	1-133 to 1-86	Some spermatozoa in epididymis. Died of phthisis.
60	1-146 to 1-82	No spermatozoa. Died of phthisis.
86	1-160 to 1-100	Died of pneumonia. Fatty matter in testis. No spermatozoa.
8	1-422	Died of phthisis.
18 months.	1-400 to 1-266	Died of pneumonia. Child puny and emaciated.
6 weeks.	1-333 to 1-230	Died of pneumonia. Body much emaciated.
Stillborn.	1-307	Well-nourished fœtus; born at full period.
Stillborn.	1-300 to 1-222	Fœtus weighed 6 lbs.

The enlargement of the seminal tubes of birds in the spring, and of the mammalia at the rutting season, and in young animals generally as they become capable of reproduction, has been noticed by Wagner (*Physiology, tr. by Willis*, pp. 23 and 27), and further illustrated by Mr. Gulliver in the table from which the above observations in man were taken.

testes of the same subject. In general the calibre of the tubuli corresponds to the size of the testis. Observers do not exactly agree in their estimates of the diameter of the tubuli. The average diameter of the uninjected canal is estimated by Müller at $\frac{1}{15}$ of a line, by Lauth¹ at $\frac{1}{18.5}$ of an inch. Krause found the tubuli, when filled with semen, to measure about $\frac{1}{12}$ of a line, and in old men and youths $\frac{1}{16}$. Monro reckoned the number of the seminiferous tubes at 300; Lauth made the average number 840, and he estimated the mean length of all the ducts united at 1750 feet. He found the individual ducts to vary in length, the mean being 25 inches. Krause estimated their entire length at 1015 feet. The membrane composing the tubuli is of a mucous character, as has been clearly proved by microscopic examination, and it is continuous with the mucous surface of the genito-urinary system. There is no appearance of an inter-tubular substance; the ducts are merely connected by a loose network of vessels, and consequently readily admit of being separated and unravelled. The tubes, when successfully injected with quicksilver, form a beautiful anatomical preparation. Sir A. Cooper succeeded in filling the tubes with size injection; but he has not described the mode in which it was effected, and other anatomists have failed in similar attempts.

Fig. 2.



Glandular structure of the testis, displayed by mercurial injection.—After Lauth.

a a. Glandular substance of the testis subdivided into lobes, each lobe being composed of convoluted tubuli closely packed.

b. Rete testis.

c c. Vasa efferentia.

d. Injected part of the vasa efferentia forming the coni vasculosi.

e e. Dilatations of the efferent vessels.

f. Body of the epididymis.

g. Tail of the epididymis.

h. Vasculum aberrans.

i. Convoluted part of the vas deferens.

k. Straight part of the vas deferens.

¹ Mém. de la Société, d'Hist. Nat. de Strasbourg, t. 1.

When the tubuli seminiferi are unravelled, they are found to divide, and form numerous anastomoses, which increase in frequency towards the circumference of the testicle (see Fig. 3, $a^1 a^1$). The tubuli thus form one vast network of communication, so that it is impossible to isolate completely either a duct or a lobule. The credit of making this interesting discovery of the anastomoses of the seminal tubes is due to Lauth. In only one instance did he succeed in finding a duct terminating in a blind pouch, and this he regarded as exceptional. Blind ends have been found, however, more frequently by Krause. The anastomoses of the tubules have been observed in the rat and other animals as well as in man. The convolutions of the seminal tubes diminish in number as they approach the mediastinum, and cease altogether at a distance of from one to two lines, where two or more unite to form a single straight duct, termed *vas rectum*, which joins the rete testis at a right angle (a^2, a^2). The vasa recta are very slender, and easily give way when injected: their calibre, which is greater than that of the seminal tubes, is estimated by Lauth at $\frac{1}{108}$ of an inch. Haller reckoned their number at twenty, which is, however, too few.

Fig. 3.

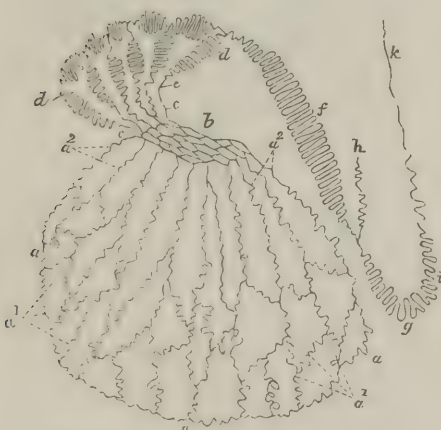


Diagram of the testis, after Lauth.

 $a a a$. Tubuli. $a^1 a^1$. Subdivisions and anastomoses of the tubuli. $a^2 a^2$. Vasa recta.

The other references are the same as in Fig. 2.

Rete Testis, as its name implies, consists of a plexus of seminal tubes, which occupies the corpus Highmori, or mediastinum testis. The vasa recta, after penetrating the walls of this body, terminate in from seven to thirteen vessels, which, running parallel to each other in a waving course, and frequently dividing and anastomosing, form the *rete testis* (b). Lauth found the mean diameter of the vessels of the rete in injected

preparations $\frac{1}{72}$ of an inch. According to Prochaska, these vessels

are supplied with valves, but such is not the case. Small dilations, however, are often found in different parts of the plexus.

III. THE EXCRETORY PARTS.

The *epididymis*, a continuation of the testis, is a body of a crescentic form, divided into an anterior and upper extremity, called *head*, or *globus major*, which is firmly attached to the testicle; a middle part or *body*, which is less in size, and separated from the gland by a pouch of the tunica vaginalis; and a *tail* or *globus minor*, connected to the testis by cellular tissue. The volume and weight of the epididymis vary in different subjects, but are proportionate to the size of the testis. It is longer than the testis, measuring about two inches in length and four or five lines in width. Its name (from ἐπὶ, upon, and δίδυμος, testis) indicates its position, which is along the postero-superior border of the gland. The epididymis is chiefly made up of seminal canals connected and supported by a firm resisting cellular tissue. The ducts which spring from the upper part of the rete testis to form the epididymis are termed *vasa efferentia*. They are usually about twelve or fourteen in number, but vary from nine to thirty. The inflections of each of these efferent ducts are so arranged as to form in the head of the epididymis a series of elongated conical figures called *coni vasculosi*. These ducts at their commencement run straight for a distance of about one or two lines, when they form convolutions which become more numerous and close as the ducts recede from the testis. Their length varies, the upper ones being the shortest. Lauth found their average length to be seven inches four lines, and calculating their number at thirteen, he makes the united length of the vasa efferentia nearly eight feet. He states that the efferent ducts diminish in size from their commencement to their termination in the canal of the epididymis, where they are less than the seminiferous ducts of the testicle (see Fig. 4). As in the rete, round dilatations of variable size are often met with in these ducts (see Fig. 2, *ee*). The efferent ducts, after forming the coni vasculosi, successively join a single duct, the canal of the epididymis, at irregular distances, the intermediate portions of the duct varying in length from half an inch to six inches. The efferent ducts are more slender than the canal of the epididymis, and frequently give

way under the pressure of the column of mercury when injected. The body and tail of the epididymis are entirely made up of the convolutions of the single canal in which the vasa efferentia terminate, closely connected by cellular tissue. Monro described this

Fig. 4.



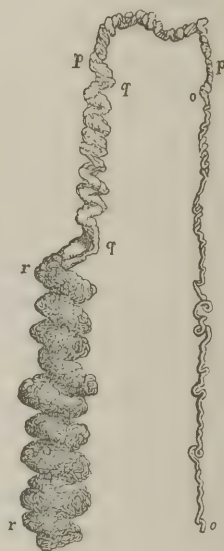
An efferent vessel and a portion of the head of the epididymis magnified, to show the progressive diminution of the canal of the cone, and the calibre of this vessel, in comparison with that of the canal of the epididymis.

c. Vas deferens.

d. Inflected portion of the duct.

e e. Head of the epididymis.—After Lauth.

Fig. 5.



Canal of the epididymis partly unravelled to show the four series of inflections which the duct undergoes in the several divisions of the epididymis.

o o. First series of inflections.

p p. Second series.

q q. Third series.

r r. Fourth series.—After Lauth.

canal as gradually increasing in size from the head to the tail, and he estimated its calibre about its middle at $\frac{1}{80}$ of an inch. Lauth states that its size is subject to great irregularities in different parts and in different subjects. This anatomist has particularly described the convolutions of this duct, and has shown that they are regularly arranged in four series, which successively increase in size, the first being the smallest, and the fourth the largest. The arrangement will be best understood by reference to Fig. 5. Monro estimated the length of the canal at thirty feet eleven inches. Lauth found its mean length to be nineteen feet four inches eight lines. The

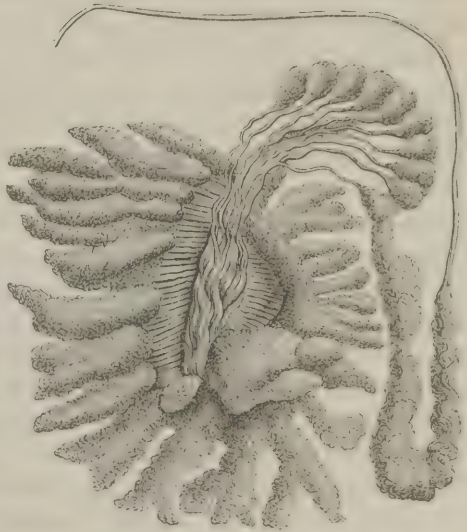
parietes of the canal are strong and bear considerable resistance. The canal of the epididymis terminates in the excretory duct of the testis, the vas deferens, and is usually contracted at the part where the two join. It was calculated by Monro that the semen before arriving at the vas deferens traverses a tube forty-two feet in length. Lauth, however, makes the whole distance but little more than twenty-two feet.

[The annexed drawing is made from a mercurial injection of the testicle, by J. P. Hopkinson, and given by him to the University of Pennsylvania. It is laid open so that the rete testis is in the centre. It shows well the tubuli seminiferi on each side, the vasa recta, the rete testis, the coni vasculosi, &c. It seemed to possess no vasculum aberrans.]

Vasculum aberrans.

—This name was given by Haller to a blind duct or cæcal appendage often found connected either to the epididymis or vas deferens. It is more commonly attached at the angle formed by the termination of the former in the latter. (See Figs. 2 and 3 *h.*) It forms a convoluted duct as large as the canal of the epididymis, which is contracted at its insertion, and terminates in a blind and often dilated extremity. Sometimes after being dilated for a certain distance it diminishes, and becoming very minute, is lost in the cellular tissue of the cord. It usually passes up the cord for about two or three inches, but has been found to extend as far up as the brim of the pelvis. The length of this appendage when unravelled varies from one to twelve or fourteen inches. The vasculum aberrans is not constantly present; indeed Monro found it

Fig. 6.



only four times in sixteen, but I believe with Lauth that it exists more frequently. Occasionally there is more than one, and as many as three have been found both by Lauth and Sir A. Cooper. Hunter regarded these ducts as supernumerary vasa deferentia of a nature similar to the double ureters.¹ Müller states that their office is evidently the secretion of a fluid which they pour into the epididymis.² I am inclined to think, however, that the duct does not serve any particular office; but is a sort of diverticulum, which, though common, must be viewed as accidental, like the process not unfrequently connected with the intestinal canal.

Vas deferens, the excretory duct of the testicle, commences from the tail of the epididymis, and terminates in one of the ejaculatory canals behind the bladder. Arising from the contracted part of the canal of the epididymis at an acute angle, it ascends along the inner side of this body, from which it is separated by cellular tissue and the spermatic arteries and veins. A right or left testis may thus always be distinguished by the circumstance that when the testis is in position, the vas deferens is situated on the inner or mesial side of the organ. In this part of its course, for the distance of about an inch and a half, or more, the vas deferens forms numerous convolutions (see Figs. 2 and 3 *i*), which gradually cease as the duct mounts above the testis. The inflected part of the vas deferens, when unravelled, was found by Lauth to measure six inches and a half. It afterwards takes a direct course (*k*) up the spermatic cord to the inguinal canal, passing behind and at a short distance from the spermatic arteries and veins. On entering the abdomen at the internal ring, it quits the spermatic vessels and descends into the pelvis, passing at first by the side of, and afterwards behind and below the bladder on the inner side of the corresponding vesicula seminalis, the excretory duct of which it joins at an acute angle to form the ejaculatory canal. The vas deferens is nearly uniform in thickness until it reaches the vesicula seminalis, and is lined by a fine membrane of a mucous character, which is continuous with the urethra. It is round and indurated, and harder than any other excretory duct in the body, by which character it is easily distinguished, when handled, from the other parts constituting the spermatic cord. Many anatomists have entertained the

¹ Works, by Palmer, vol. iv, p. 24.

² Physiology, trans. by Baly, vol. i, p. 456.

opinion that the parietes of this duct are muscular. It is distinctly so in the bear, bull, and other animals. On careful examination, however, of sections of the human vas deferens in the microscope, I could discover nothing more than simple fibrous tissue.

IV. THE VESSELS AND NERVES.

Spermatic vessels.—The spermatic arteries, the chief vessels supplying the testes, arise in pairs, at a very acute angle, from the fore part of the aorta, immediately below the renal arteries. Their origin is subject to considerable varieties. The two seldom arise at the same level, and the right is often a branch of the right renal artery. Sometimes one or both come off from the superior mesenteric. Occasionally there are two spermatic arteries on one or both sides, arising in the regular way. All these deviations are more frequently met with on the left than on the right side of the body. Each artery pursues a tortuous course downwards and outwards, passing behind the peritoneum obliquely across the psoas muscle and ureter, to which, as well as to the surrounding cellular tissue, it gives off several branches. The artery then enters the inguinal canal through the internal ring, and emerging at the external, passes down the cord, being surrounded in its course by the spermatic veins. The further distribution of the artery is thus correctly described by Sir A. Cooper. When the artery reaches from one to three inches from the epididymis, varying in different subjects, it divides into two branches, which descend to the testicle on its inner side, opposite to that on which the epididymis is placed; one passing on the anterior and upper, the other to the posterior and lower part of the testis. From the anterior branch the vessels of the epididymis arise; first, one passes to its caput; secondly, another to its body; and, thirdly, one to its cauda and the first convolutions of the vas deferens, communicating freely with the deferential artery. The spermatic artery, after giving off branches to the epididymis, enters the testis, by penetrating the outer layer of the tunica albuginea; and dividing upon its vascular layer, they form an arch by their junction at the lower part of the testis, from which numerous vessels pass upwards; and then descending, they supply the lobes of the tubuli seminiferi. Besides this lower arch there is another passing in the direction of the rete, extremely convoluted in its course, and forming an anastomosis between the principal

branches. The testis receives a further supply of blood from another vessel, the artery of the vas deferens, or posterior spermatic artery, which arises from one of the vesical arteries, branches of the internal iliac. This artery divides into two sets of branches, one set descending to the vesicula seminalis, and to the termination of the vas deferens; the other, ascending upon the vas deferens, runs in a serpentine direction upon the coat of that vessel, passing through the whole length of the spermatic cord; and when it reaches the cauda epididymis, it divides into two sets of branches, one advancing to unite with the spermatic artery to supply the testis and epididymis, the other passing backwards to the tunica vaginalis and cremaster.

The spermatic veins spring in three sets from the testis, one from the rete and tubuli, another from the vascular layer of the tunica albuginea, and a third from the lower extremity of the vas deferens. The veins of the testis pass in three courses into the beginning of the spermatic cord: two of these quit the back of the testis, one at its anterior and upper part, and a second at its centre; and these, after passing from two to three inches, become united into one. The other column accompanies the vas deferens. There is also a large vein just above the testis, which crosses to join the columns. The veins of the epididymis are one from the caput, another from its body; one from its cauda, and another from its junction with the vas deferens, besides some small branches: they terminate in the veins of the spermatic cord. The veins, after quitting the testis, become extremely tortuous, and frequently divide and inosculate in the cord, forming a plexus termed *vasa pampiniformia*. These communications cease as the veins approach the ring, which they enter, and ascending along the psoas muscle in company with the spermatic artery, unite to form a single vein, which usually terminates on the right side in the vena cava inferior, and on the left in the renal vein; though this is subject to some variety. The left spermatic veins pass under the sigmoid flexure of the colon. Many anatomists speak of the spermatic veins as being destitute of valves, which they assign as one of the reasons for the occurrence of varicocoele. I have several times injected these veins with alcohol, and on laying them open, have observed valves in the larger vessels, and I have also found injections thrown into the veins arrested by the valves. They are

seldom seen, however, very near the testis, or in smaller veins, forming the plexus; nor have I observed them within the abdomen.

Absorbents.—The absorbent vessels of the testis are very numerous, and arise from every part of its internal structure and coats. They unite to form four or five trunks, which ascend along the cord, and traverse the inguinal canal, without communicating with the glands in the groin, but pass upwards in front of the psoas muscle, behind the peritoneum, and terminate in the lumbar glands, on the side of the aorta.

Nerves.—The nerves of the testis are derived chiefly from the renal plexus, but partly also from the superior mesenteric and aortic plexuses. These nerves descend in company with the spermatic artery to the cord, where, being joined by branches from the hypogastric plexus, which pass along the vas deferens, they form together the spermatic plexus, the branches of which are intermingled with the vessels of the cord, and ultimately terminate in the substance of the testis. A few twigs from the external spermatic nerve may also be traced to the coverings of the gland. The minute distribution of these nerves forms a very difficult dissection.

SPERMATIC FLUID.

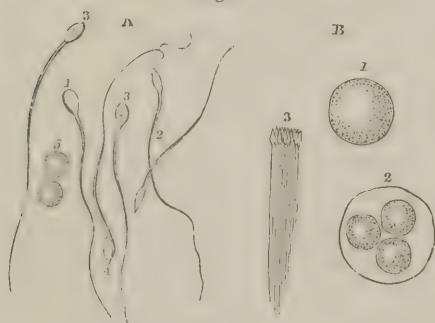
The sperm or secretion of the testis is a thick tenacious fluid, of a whitish or grayish-white color, and of greater specific gravity than water. It has an alkaline reaction, and is composed of albumen, phosphatic and hydrochloric salts, and a peculiar animal matter called *spermatine*. According to the analysis of Vauquelin, human spermatic fluid consists of the following ingredients:

Water,	.	.	.	.	.	.	.	.	.	90
Animal mucus,	.	.	.	.	.	.	.	.	.	6
Free soda,	.	.	.	.	.	.	.	.	.	1
Phosphate of lime,	.	.	.	.	.	.	.	.	.	3
Peculiar animal principle,	.	.	.	.	.	.	.	.	.
										<hr/>
										100

When first voided, the sperm has a peculiar odor, which has been compared to that of the farina of the Spanish chestnut; but this odor appears to be derived from the secretions of the vesiculæ seminales, prostate, and the mucous glands of the urethra, which are always mixed with it when evacuated, as pure semen taken from the epididymis or vas deferens has no such smell. On examination in

the microscope, with a high power, this fluid is found to contain a multitude of minute bodies closely crowded together, which in recent semen display very lively movements. These bodies (A 1, 2, 3, 4), are the *seminal animaleules*, or *spermatozoa*, as they are more properly termed; for it is

Fig. 7.



Spermatozoa from man, and their development (Wagner). A. Spermatozoa from the semen of the vas deferens. 1 to 4. Show their variety of character. 5. Seminal granules.—B. Contents of the semen of the testis. 1. Large round corpuscle or cell. 2. A cell containing three roundish granular bodies, from which the spermatozoa are developed. 3. A fasciculus of spermatozoa, as they are seen grouped together in the testis.

yet a question among physiologists, whether they are independent parasitic animals, or merely animated particles of the organism in which they exist. A spermatozoon consists of a flattened oval and perfectly transparent body, terminating in a filiform tapering tail, which together measure from $\frac{1}{50}$ th to $\frac{1}{40}$ th of a line in length. The spermatic fluid also contains a number of minute round colorless granular corpuscles (A 5), which vary in quantity, but are usually much less numerous than the spermatozoa. Both these elements of the sperm are suspended in a clear transparent fluid, termed the *liquor seminis*. Wagner has shown that the spermatozoa are developed within cells, and originate from the spermatogenic granules, being formed by the dispersion of the nuclei of these cells.¹

The spermatozoa are peculiar to the spermatic fluid and the chief characteristic of this secretion. They are always present in it after the age of puberty, and do not disappear whilst man retains the power of procreation, having been met with in persons of a very advanced age. They live for many hours after ejaculation; blood produces no effect on them, but urine renders their motions feeble, and hastens their death. The quantity of spermatic fluid emitted in sexual union varies from one to two or three drachms.

¹ Much curious information respecting the spermatic fluid may be found in Wagner's *Physiology*, tr. by Dr. Willis; Müller's *Physiology*, tr. by Dr. Baly, and in Lallemand, *Des Pertes Seminales Involontaires*, t. 2.

DISEASES OF THE TESTIS.

CHAPTER I.

CONGENITAL IMPERFECTIONS AND MALFORMATIONS.

SECTION I.

NUMERICAL EXCESSES AND DEFECTS.

Supernumerary Testicles.—Cases of supernumerary testicles are mentioned in the writings of the old authors, and persons have been described with four or five of them, accompanied with a proportionate increase in the venereal appetite. Nearly all these cases are of a fabulous character, the observations during life not having been confirmed by dissection after death. Such must be remarked of the case of *πεντάρχος*, or man with five testicles, mentioned by Schaarf,¹ and with that of a man with four testicles, alluded to by Blegny.² Blasius, an old writer not unworthy of credit, has given an account of the examination of the body of a man, thirty years of age, and otherwise well formed, who had two testicles on the right side, of the same size and shape as that on the left, which is illustrated by a small engraved figure representing a distinct artery from the aorta, and vein from the vena cava proceeding to each of the two testicles on the right side.³ This is the only case of supernumerary testicle recorded by the old authors which has any semblance of authenticity. Neither Morgagni, Haller, nor Meckel met with a single example, and they questioned the existence of such a condition.

¹ Eph. Nat. Cur. Dec. iii, Ann. v, vi, Obs. 89, p. 175.

² *Zodiaque Français*, Ann. 11. Most of the reputed cases of *Triorchides* are quoted by Arnaud in his *Mémoires de Chirurgie*, Mém. iii, part 1.

³ Ger. Blasius, Obs. Med. Anat. Obs. 20, p. 60.

Two cases of the kind have recently been recorded, but they were not verified by examination after death. One is related by Blümner;¹ the other by Dr. Macann, a British army surgeon.²

A fatty or fibrous tumor in the scrotum, or an encysted hydrocele of the cord or testicle, especially the latter, might readily be mistaken for an additional testicle. Morgagni mentions that he was once deceived by a portion of omentum. In the pathological collection at St. Thomas's Hospital, is preserved the testicle of the eccentric Dr. Monsey, who appeared during life to be supplied with three of these glands. The supposed additional testicle consists of an indurated fibrous tumor, attached apparently to the tunica vaginalis. Several persons have consulted me, supposing that they had a supernumerary testicle in the scrotum, but in every instance I have been able to recognize without difficulty one of the tumors just mentioned. In addition to the ordinary characters of the particular swelling, the absence of the testicular pain on pressure will materially assist the diagnosis, as is shown in the following case:—A medical friend brought to me a young gentleman supposed to have three testicles. He had been examined some years before by Sir A. Cooper, who, it was stated, was inclined to believe that this was the case. On examination, I found the left testicle of its full size and in proper position. On the right side I felt two bodies; one, the larger of the two, was about half the size of the left testicle. The spermatic cord could be traced to it, and compression produced the usual sickening sensation experienced from pressure on the testicle. Below this, but distinct from it, and quite free in the scrotum, was an oval-shaped body, the size of a small walnut, which was tense and elastic, and felt very much like a small testicle; the two bodies on the right side being about equal in volume to the left testicle. Something like a vas deferens even could be traced to the lower tumor, but compression of it produced scarcely any uneasiness. On taking the patient into a dark room, and examining the part by transmitted light, I plainly perceived that the supposed third testicle was a cyst, containing fluid, an encysted hydrocele of the testicle.

Absence of one or both Testicles.—Many instances of *monorchides*, or persons having only a single testicle, are also mentioned by the old authors; but as the data are very imperfect, and as little

¹ Rust's Magazin für die Gesammte Heilkunde, for 1824.

² Provincial Medical Journal, Nov. 5, 1842, p. 113.

was known respecting the transition of the testicle at the time these cases were recorded, they cannot be regarded as authentic. They were most probably cases in which one of the glands was either retained within the abdomen, or from some cause had been completely atrophied. I know no good reason why a deficiency of one or both testicles should not occasionally occur without any other malformation; but they are anomalies of which there are very few authentic examples in the annals of medical science.

Mr. Page, of Carlisle, recently sent me a right single testicle of remarkable size, which he had removed in 1844, from the scrotum of a lad, aged seventeen, who died on his way to the Cumberland Infirmary from injuries received in a steam sawing machine. When prepared for maceration by cutting away the tunica vaginalis, this monster testicle was found by Mr. Page to weigh two ounces, two drachms, and two scruples. After it had been several years in spirit, I found its weight to be nine drachms. The organ was quite healthy in structure, and the epididymis was loaded with secretion.¹ Mr. Page states, "the course of the left testicle was so minutely examined as to satisfy me that no such organ existed." This is a satisfactory example of *monorchis*, and that it was an original defect appears to be confirmed by the remarkable hypertrophy of the existing gland; a circumstance I have never observed in any instance of single undeveloped or retained testicle, or wasted gland.²

Professor Paget has published the particulars of a case in which he believes one testicle was deficient at birth.³ No account of the man accompanies the details of the dissection, and it is open to question whether the deficiency of the gland was not the result of atrophy. Dr. Fisher, of Boston, has recorded a case of absence of both testicles. The deficiency was remarked from birth, and the subject of the malformation was regarded as a natural eunuch, and died at the age of forty-five.⁴

In a most scrupulous dissection of a male subject, recorded by the accurate anatomist, Blandin (*Anatomie Topographique*, p. 411),

¹ The testicle is preserved in the Museum of the College of Surgeons.

² In one instance of a right testicle retained within the abdomen of a strong man, the left gland was found to weigh seven drachms fifteen grains. The mean weight of a healthy testicle is about six drachms.

³ *London Medical Gazette*, vol. xxviii, p. 817.

⁴ *American Journal of the Medical Sciences*, vol. xxiii, p. 352.

he could find no testicle on one side of the abdomen, and no trace of the corresponding cord, vas deferens, and vesicula seminalis; nor was there any mark of a wound discoverable in the scrotum.

Mr. Thurnam has given an account of the dissection of an infant who died at the age of four months. In addition to an atrophied condition of the right kidney, and a remarkable malformation of the ureters, it was found that neither of the testicles had descended. The right lay in the abdominal cavity, just above the inguinal canal. On the left side no testicle would appear to have been formed; the spermatic vessels on this side terminated in a little mass of fat; the vas deferens, however, was present, and was apparently as well developed as that of the perfect testicle.¹ A case of monstrosity is related by Dr. Friese in Casper's *Wochenschrift*.² The child lived only half an hour: in addition to the absence of the external genital organs, there were neither testes, vasa deferentia, nor vesiculæ seminales. Cases, however, in which the whole of the genital apparatus is deficient or irregularly formed do not come within the scope of this work.

Union of the Testes.—Geoffroy St. Hilaire has recorded the following remarkable, and, I believe, unique case of union of the testicles in the abdomen. It was communicated to him by M. Breton, of Grenoble. An infant was born at Vizille in 1812: several physicians consulted respecting the child's sex were of different opinions; they decided, however, to inscribe it in the registers as a girl. It died at the age of eighteen months, and was dissected by Dr. Breton, who recognized a complete hypospadias. The scrotum was bifid and empty; and the two subrenal capsules, as well as the two kidneys and the two testicles, were joined together upon the median line. The spermatic arteries and veins, vesiculæ seminales, and vasa deferentia, exhibited nothing remarkable, each half of the double testicle receiving its particular vessels.³

SECTION II.

DEFICIENCIES AND IMPERFECTIONS OF THE VAS DEFERENS.

In Mr. Paget's case of supposed absence of the testicle, it is stated that the vas deferens terminated nearly opposite the exter-

¹ London Medical Gazette, vol. xx, p. 717.

² Dec. 25. 1841, quoted in the British and Foreign Medical Review for April, 1842.

³ 527.

³ Hist. des Anomal. de l'Organ. t. i. p. 542.

nal ring in a rounded cul-de-sac; and in Dr. Fisher's case of deficiency of both testicles, that the vasa deferentia, though properly formed and nearly of natural size, terminated in culs-de-sac at the end of the cord. In the Museum of St. Bartholomew's Hospital there is a preparation taken from a man, fifty years of age, who died of strangulated hernia. A piece of intestine was strictured by a band of adhesion connected with the mesentery, and the testicle was detained in the upper opening of the ring. On dissection of the parts, the vas deferens was found to terminate near the testicle in a cul-de-sac. The gland was very small, and its structure appeared granular, like the undeveloped testicle of a youth. There was no trace of the epididymis. Mr. Hunter, in dissecting a male subject, found the vasa deferentia not only deficient near the testicles, but terminating below in a single irregularly formed vesicula seminalis, and having no communication with the urethra.¹ M. Gosselin, in the dissection of a man about twenty years of age, found the vas deferens wanting on the right side from the epididymis to the upper part of the bladder.² There are a few other cases on record in which the vas deferens has been defective at the extremity which joins the ejaculatory canal. Thus Tenon, in the dissection of an infant affected with extroversion of the bladder, found that the vasa deferentia terminated separately at the bottom of the pelvis in two white tubercles: the scrotum, testes, and vesiculæ seminales were in a natural state.³ But besides these imperfections at its two extremities, this duct has been found wanting throughout nearly its whole extent. Brugnone mentions, that in dissecting the parts of generation in a robust man, from twenty-six to twenty-seven years of age, he found the right epididymis almost entirely absent, the only part remaining being the head, which formed nodules filled with semen. The rest of the epididymis and the vas deferens were wanting, without any mark of disease. The testicle was perfectly sound, and nearly of the same size as the left one. On examining the corresponding vesicula seminalis he found at its

¹ Works by Palmer, vol. iv, p. 23. There is a preparation in the Hunterian Museum at Glasgow (65 S) of two testicles which exactly agree with John Hunter's description, and are doubtless the organs dissected by him.

² Archives Générales de Médecine, 4e série, t. xiv, p. 408.

³ Mém. sur quelques Vices des Voies Urinaires, &c., in Mém. de l'Acad. Roy. des Sciences à Paris, 1761, p. 115.

anterior extremity a portion of the canal of the vas deferens about an inch in length, and properly formed. The vesicula seminalis itself was flaccid and quite empty, whilst the left was full of semen. He remarks, that although this vicious conformation was to all appearances congenital, nevertheless the vesicula seminalis and ejaculatory canal had preserved their natural cavities.¹ In a case related by Bosseha, the left vas deferens of a robust man terminated in a blind extremity near the testicle, the rest of the canal being wanting. There was a rudiment of a left vesicula seminalis in the form of a blindly ending canal running tortuously in the shape of the letter S. The left testicle was sound.²

Mr. Paget has happily explained the origin of these several defects in the vas deferens, by reference to the mode of development of the special organs of generation. He observes,³ after Müller and Valentin, that, in the normal course of human development the proper genital organs are in either sex developed in two distinct pieces: namely, the part for the formation of the generative substance, the testicle or ovary, and the part for the conveyance of that substance out of the body, the seminal duct or oviduct. The testicle or ovary as the case may be (and in their earliest periods they cannot be distinguished), is formed on the inner concave side of the corpus Wolffianum, and the seminal or oviduct, which is originally an isolated tube closed at both extremities, passes along the outer border of that body from the level of the formative organ above to the cloaca or common sinus of the urinary, genital, and digestive systems below. The perfection of development is attained only by the conducting tube acquiring its just connections at once with the formative organ, and, through the medium of the cloaca, with the exterior of the body. The sexual character is first established, when, in the male, the formative and conducting organs become connected by the development of intermediate tubes which constitute the epididymis; or when in the female, a simple aperture is formed at the upper extremity of the conducting tube, and is placed closely adjacent to the formative organ. In both sexes

¹ Observ. Anat. sur les Vésicules Séminalles. Mém. de l'Acad. Roy. des Sciences à Turin. 1786, and 1787, p. 625.

² Diss. sistens Obs. de vesicula seminalis sinistra defectu, integris testibus, vase vero deferente clauso, quoted by Dr. Vrolik, Handboek der Ontleedkundige Ziekte-kunde, 1st Deel. p. 210.

³ Loc. cit. p. 818.

alike, the lower extremities of the conducting tubes first open into the common cloaca, and subsequently, when that cavity is partitioned into bladder and rectum, or bladder, vagina, and rectum, they acquire in each their just connections, and become in the male the perfect vasa deferentia, and in the female Fallopian tubes and uterus.

Now in Brugnone's case, and in Bosscha's, we have examples of one of the male conducting tubes being developed in only a very small portion of its natural extent. These, therefore, clearly confirm the description just given; for they prove that the testicles may be formed quite independently of the vasa deferentia. In the other cases the vas deferens was probably formed originally in its whole length; but it seems to have failed of acquiring its due connection in the one series of defects at the end next to the testicle, and in the other at the end next to the bladder.

The inquiry is not without interest,—What influence have these congenital deficiencies and imperfections in the vas deferens on the evolution and subsequent condition of the testicle? In the case of the adult which occurred at St. Bartholomew's Hospital the gland was small, and its structure appeared granular, like the undeveloped testicle of a youth; but as it had not passed into the scrotum, and was combined with hernia, there may have been other causes impeding its due evolution. In Mr. Hunter's case, the testicles, which were in the scrotum, were very sound, and appeared to me in a recent examination of good size. In M. Gosselin's case the testicle was of proper size and healthy in structure, and the canal of the epididymis was dilated and distended with a yellow fluid containing a large quantity of dead spermatozoa. In the case of the man related by Brugnone the testicle on the side corresponding to the defective vas deferens was perfectly sound, and nearly of the same size as the other. So also in Bosscha's case it is stated that the testicle was sound. Although either of these defects in the vas deferens renders the gland a useless organ, and if it occurred on both sides of the body would necessarily cause impotency, these cases, nevertheless, tend to show that the absence or imperfection of the excretory duct does not prevent the development of the testicle at the proper period, and has no direct influence in causing it to waste. In cases of closure of the excretory duct from disease also, the nutrition of the gland is generally preserved. In several

dissections of testicles, in which an obliteration had taken place at the commencement of the vas deferens, I observed no wasting of the organ. M. Gosselin, in the paper containing the case above noticed, has adduced several observations in which the duct was obliterated in the tail of the epididymis, both with and without dilatation of the tube in this part, the gland preserving its normal appearance. These observations are fully confirmed by experiments on animals. Sir A. Cooper relates, that in 1823 he divided, upon a dog, the vas deferens upon one side, and the spermatic artery and vein on the other. The testicle upon that side on which the artery and vein were divided gangrened, and sloughed away. The testicle on the other side became somewhat larger than natural. He kept the dog for six years; during that time he was twice seen *in coitu*, but the female did not produce. This was in 1827. In 1829 he killed the dog, and found the vas deferens below the division excessively enlarged, and full of semen, and entirely stopped, with some separation of its extremities; but it was open from the place of division to the urethra.¹—February 23d, 1842, I divided the vas deferens and a small artery running close to it (not the spermatic) on the left, and excised a small piece of the vas deferens on the right. The dog afterwards evinced a partiality for a bitch in a neighboring house. He was killed the 26th of April following. The abdominal aorta was injected. The right testicle was healthy, and of good size; its epididymis was hard, and clogged with a thick white substance which contained abundance of spermatozoa. The divided ends of the ducts were separated and closed. The right spermatic artery was of its normal size. The left testicle was atrophied, and presented no trace of its natural structure. The parts composing the cord were matted together, and extremely indistinct at the point where the vas deferens had been divided. This duct was reduced to a mere cord. The left spermatic artery appeared obliterated, for no injection had passed into it, and the vessel was scarcely perceptible. These changes on the left side, I suspect, were the result of inflammation induced by the operation.—April 9th, 1842, in a young bull terrier I excised a small portion of the vas deferens on the left side, and on the right tied a ligature tightly round all the parts composing the cord, except the vas defe-

¹ Anatomy of the Testis, p. 51. The testicle is represented in the plate of full size.

rens, and divided the included parts below the ligature. The dog was killed on the 25th of June following. The left testicle was of its natural size, and contained spermatozoa. The right testicle was completely atrophied, a small epididymis attached to the end of the vas deferens being all that remained of the gland.—April 26th, 1842, in a large young dog, whose testicles had not acquired their full size, I exposed the cord, and made a simple division of the vas deferens on the left side. The dog was killed on the 25th of June following. The two testicles were exactly of the same size, but the left was loaded with fluid containing spermatozoa. The ends of the divided vas deferens were separated and closed.—June 29th, 1842, in a kitten eight weeks old I divided the vas deferens on each side, and separated the cut extremities of the ducts. He grew a remarkably fine cat; and in the following February became restive and noisy, and evinced a disposition to rove from the house. On the 24th of the month I excised the testicles. They were plump, and filled with fluid which was found to contain abundance of lively spermatozoa.¹

The foregoing cases and experiments show, then, that the testicles may be properly developed, though a physical obstacle to the elimination of their secretion is present from birth; and that so long as the testicles exist entire, though to no purpose, the individual acquires and preserves all the marks of the male sex; the secreting alone appearing to be the special organs of generation upon which the sexual characters depend. The engorgement of the seminal ducts with sperm is liable, it is true, to cause inflammation of the testicle, which may end in atrophy, but this is only a secondary and indeed a rare effect of the interruption in the excretory duct.

SECTION III.

IMPERFECT TRANSITION OF THE TESTICLE.

It occasionally happens that at birth one or both testicles have not passed into the scrotum, being detained either in the abdomen

¹ M. Gosselin has since performed two similar experiments on dogs. One was killed and examined ten months, the other four months after section of the vas deferens. In both the testicle was of normal size. (*Archives Générales de Médecine*, Sept. 1853.)

near the groin, in the inguinal canal, or in the groin just outside the external ring. In a table of 103 male infants, examined by Wrisberg at the time of birth, it appears that seventy-three had both testicles in the scrotum; in twenty-one, one or both were in the groin. Of these, five had both, seven the right, and nine the left in the groin; in twelve, four had both, three the right, five the left, only in the abdomen.¹ According to this table, the imperfection occurs rather more frequently on the left side than on the right, in the proportion of seven to five. In twenty-five cases examined at different ages, varying from five to sixty,—sixteen of which came under my observation, the remainder being taken from the recorded experience of others,—in thirteen the imperfection was on the right side, and in twelve on the left. Dr. Marshall states, that in the examination of 10,800 recruits, he had found five in whom the right, and six in whom the left testicle was not apparent. In two of these cases there was inguinal hernia on the side where the testicle had not descended.² He met with but one instance in which both testicles had not appeared.³ The testicle sometimes remains permanently fixed in the situation in which it is placed at birth;⁴ but in some instances the passage, though delayed, is completed at some period previous to puberty, and often within a few weeks after birth. Mr. Hunter was of opinion that this completion most frequently happens between the years of two and ten. Of the twelve cases mentioned by Wrisberg, in which one or both testicles were retained in the abdomen, in one the descent took place the day of birth, in three on the day after, in three others on the third day, in two instances on the fifth day, and in one on the twenty-first day: in the other cases the testicles had not appeared at the fourth or fifth week after parturition. My own observations lead me to believe, that if the passage does not take place within a twelvemonth after birth, it is rarely fully and perfectly completed afterwards, without being accompanied with rupture. For the causes which operate at this late period tend as much to promote the formation of hernia as the transition of the testicle.

¹ Commentatio Soc. Reg. Scient. Goetting. 1778.

² Hints to Young Medical Officers in the Army, p. 83.

³ Ibid. p. 207.

⁴ Persons whose testicles had not made their appearance were called *αποῤῥηκιδες*, or *testicondi*, by the ancients.

In cases where the testicle makes no appearance before puberty, uneasiness is often experienced at that period, owing to the enlargement of the gland being restrained by the rings and parts composing the inguinal canal. At the same time also, it is often protruded outside the external ring by the movements of the abdomen in respiration.

Considerable doubt long prevailed respecting the mode and agency by which the passage of the testicle into the scrotum is effected. Several years ago I carefully investigated this subject;¹ and as it is impossible to treat satisfactorily of the causes of a failure in the transition without describing the process itself, I must premise a short account of the change, and of the parts concerned in effecting it.

Attached to each testicle whilst in the abdomen is a peculiar body, termed by Mr. Hunter the *gubernaculum*, as it was supposed to serve as a guide to the testicle in its passage. It is a soft, solid, projecting body, of a conical form, which varies somewhat in shape and size at different periods of the transition of the testicle, becoming shorter and thicker as the gland approaches the abdominal ring. It is situated in front of the psoas muscle, to which it is connected by a reflection of peritoneum. Its upper part is attached to the inferior extremity of the testicle, lower end of the epididymis, and commencement of the vas deferens. The lower part of this process passes out of the abdomen at the abdominal ring, and diminishing in substance and spreading terminates in three processes, each of which has a distinct attachment. The central part and bulk of the gubernaculum is composed of a soft transparent gelatinous substance, which, on examination by the microscope, is found to consist of nucleated cells, the primitive connective tissue: this central mass is surrounded by a layer of well-developed muscular fibres, which may be distinguished by the naked eye, and which can be very distinctly recognized in the microscope to be composed of striped elementary fibres. These muscular fibres, which may be traced the whole way from the ring to the testicle, are surrounded by a layer of the soft elements of the connective tissue, similar to that composing the central mass; and, in the same way as the testicle, the whole process, except at its posterior part, is invested with peri-

¹ Vide Observations on the Structure of the Gubernaculum, and on the Descent of the Testis in the Fetus, by the author, in Lond. Medical Gazette, April 10. 1841, or in the Lancet, of the same date.

toneum. On carefully laying open the inguinal canal and gently drawing up the gubernaculum, the muscular fibres may be traced to the three processes, which are attached as follows: the external and broadest is connected to Poupart's ligament in the inguinal canal; the middle forms a lengthened band which escapes at the external abdominal ring, and passes to the bottom of the scrotum, where it joins the dartos; the internal takes the direction inwards, and has a firm attachment to the os pubis and sheath of the rectus muscle. Besides these, a number of muscular fibres are reflected from the internal oblique on the front of the gubernaculum. It thus appears, that the attachments of the muscle of the gubernaculum, and those of the cremaster in the adult, are exactly similar. I have succeeded in tracing out the former before the testicle has moved from its original position, at different stages of the process of transition, and immediately after its completion; and of the identity of the two muscles I entertain no doubt.

Between the fifth and sixth month of foetal existence, sometimes later, the testicle begins to move from its situation near the kidney towards the ring, which it usually reaches about the seventh month. During the eighth month it generally traverses the inguinal canal, and by the end of the ninth arrives at the bottom of the scrotum, in which situation it is commonly found at birth. The testicle, both during its passage to the ring and through the inguinal canal, carries along with it its original peritoneal coat, adhering by the reflection of this membrane, during the whole of its course to the parts behind in the same manner as whilst situated below the kidney. The testicle therefore does not pass directly and abruptly into a pouch prepared to receive it, but carries the peritoneum with it, continuing to be connected to the parts behind by the reflection of the membrane, between the folds of which the vessels and nerves join the gland. In the passage of the testicle from the abdomen to the bottom of the scrotum, the gubernaculum, including its peritoneal investment and muscular fibres, undergoes the same change as that which takes place in certain of the *rodentia* at the access of the season of sexual excitement; the muscle of the testicle is gradually everted, until, when the transition is completed, it forms a muscular envelope external to the process of peritoneum, which surrounds the gland and front of the cord. As the testicle approaches the bottom of the scrotum, the gubernaculum diminishes in size, owing to a change

in the disposition of its areolar elements; the muscular fibres, however, undergo little or no diminution, and are very distinct around the tunica vaginalis in the recently transposed testicle. The mass composing the central part of the gubernaculum, which is 'so soft, lax, and yielding, as in every way to facilitate these changes, becomes gradually diffused, and after the arrival of the testicle in the scrotum, contributes to form the loose connective tissue which afterwards exists so abundantly in this part; the middle attachment of the gubernaculum, which may be traced to the dartos, at the bottom of the scrotum, gradually wastes away and soon becomes indistinct, though slight traces of this process often remain to the latest period of life.

Thus, after death, in dragging the testicle of an adult out of the scrotum by pulling the cord, the lower part of the gland, which is uncovered by serous membrane, is often found connected to the bottom of the scrotum by a band of firm and dense connective tissue, which requires division with the scalpel. This band is the remains of the middle attachment of the gubernaculum. In cases in which the testicle has been retained in the groin, I have traced a cord of dense tissue from the gland to the lower part of the scrotum. After the arrival of the testicle in the scrotum, the peritoneum with which it is closely invested, its original envelope, becomes the inner layer of the tunica vaginalis; whilst the pouch around, which is continuous with it, forms the outer layer, or vaginal sac. Immediately after the arrival of the testicle in the scrotum, this bag communicates with the abdomen, and in quadrupeds continues to do so during life; but in the human subject it soon begins to close, and when the foetus is ushered into the world, the abdominal orifice is often shut, and the whole canal from the ring to the upper part of the gland is, in general, completely obliterated in the course of the first month after birth. The obliteration is effected by an intimate union of the sur-

Fig. 8.

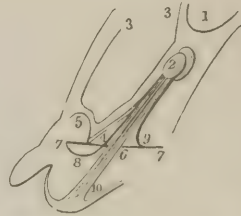


Diagram of the gubernaculum and testicle previous to its descent.

1, the kidney; 2, the testicle; 3, 3, the peritoneum; 4, vas deferens passing down into the pelvis by the side of the bladder; 5, the bladder; 6, the abdominal ring; 7, 7, Poupart's ligament; 8, pubic portion of the cremaster; 9, fibres of the cremaster arising from Poupart's ligament; 10, portion of the gubernaculum attached to the bottom of the scrotum.

faces of the serous membrane. It sometimes does not take place at all,¹ or is delayed or only partially completed. Congenital hernia, or hydrocele, is the result of a failure in this process; and other forms of hydrocele are occasioned by imperfect obliteration of the canal.

Much difference of opinion exists as to the immediate cause of the transition of the testicle. Hunter, Meckel, and others came to the

Fig. 9.



Diagram of the testicle immediately after its arrival in the scrotum, the cremaster being everted.

1, the testicle; 2, the shortened gubernaculum; 3, 3, the peritoneum; 4, portion of the cremaster arising from Poupart's ligament; 5, pubic portion of the muscle.

conclusion that the muscular fibres of the cremaster are insufficient to bring the testicle further than the abdominal ring and to complete the passage. They were not, however, acquainted with the attachment of this muscle to the pubis external to the ring, or it would be difficult to understand why Mr. Hunter, after arriving at the conviction that the cremaster passes to the testicle whilst in the abdomen, chiefly from analogy, was not induced by the same process of reasoning to conclude, that a muscle capable of changing the position of the testicle in animals, would be adequate to accomplish the same office in the human foetus. The necessity for some active

agent to effect this change in the latter would appear to be greater even than in the lower animals, since, in the usual position of the foetus in utero, the passage of the testicle is contrary to gravitation,² and unaided by the movements of respiration. Now, when we consider the attachments and connections of this muscle in the foetus; the perfect development of its fibres, as ascertained by microscopical examination; and the circumstance that there are apparently, no other means, no other motive powers, by which this change can be effected, or in any way promoted, I think there is sufficient reason for concluding that the cremaster executes the same office in the human embryo, as that which it undoubtedly performs in certain brute animals at a particular season. The fibres proceeding from Poupart's ligament, and the obliquus internus, tend to guide the

¹ The communication constantly remains open in quadrupeds, the chimpanzee, according to Professor Owen, being the only brute animal in which the tunica vaginalis forms a shut sac.

² For this reason I have departed from the usual custom of English anatomists, and have avoided describing the change in the position of the testicle, as *the descent*.

gland into the inguinal canal; those attached to the os pubis to draw it outside the abdominal ring; and the process extending to the bottom of the scrotum, to direct it to its final destination. As the process approaches completion, the muscular fibres which perform so important a part in it gradually become everted, and acquire the new functions of elevating, supporting, and compressing the gland.

Now, when we reflect on the nature of the process just described, it is clear, that there must not only be a perfect adaptation of parts a due relation between the body displaced and the structures which it traverses, but also corresponding power in the agent by which it is accomplished. There are few muscles in the human body whose development in different individuals varies in a greater degree than that of the cremaster. And if such be the case after birth, it is not unreasonable to presume that similar differences exist in the fœtus before the gland changes its position, and that a failure in the process may be the result of deficient power in the *musculus testis* to accomplish the passage. It is not improbable that this muscle is sometimes paralyzed, and that the faulty transition is owing to a want of a due supply of the nervous energy, which we know is often denied to other muscles during fœtal existence, and is the cause of deformities in the feet and other parts, with which infants are often ushered into the world. I think, indeed, we may fairly enumerate paralysis and defective development of the cremaster amongst the presumed causes of the imperfect transition of the testicle. Peritonitis occasionally attacks the fœtus in utero,¹ and produces adhesions between the various abdominal viscera. It is well known that in congenital hernia the testicle is frequently united to a portion of intestine or omentum, and that the formation of these adhesions previous to the transition of the testicle is sometimes the cause of the displacement, the viscera being drawn, together with the gland, into the scrotum. Many facts seem to show that similar adhesions are, on the other hand, an occasional cause of the temporary and permanent retention of the testicle, the cremaster being insufficient to overcome this obstacle to its passage. In the body of an old man, M. J. Cloquet found the left side of the scrotum empty, and the testicle situated at the distance of an inch from the superior opening of the inguinal canal: the head of the epididymis was connected to the

¹ Vide Contributions to Intra-uterine Pathology, by Dr. Simpson, Edinb. Med. and Surg. Journal, Nos. cxxxvii. and cxi.

sigmoid flexure of the colon, by a strong white fibrous band.¹ Wrisberg, on examining an infant which had only the right testicle in the scrotum, and died a few days after birth, found the opposite gland close to the ring and connected to the omentum by means of three slender filaments.² Dr. Simpson, in the dissection of an anencephalic foetus, found marks of extensive peritonitis and the right testicle imbedded in a quantity of coagulable lymph, which strongly attached it to the peritoneal surface of the iliac fossa.³ Jobert once found in the foetus, the cœcum adherent to the testicle, which was on the point of passing the ring.⁴ In the examination of a man, aged sixty, I found the right testicle just external to the abdominal ring; it was small in size, and closely adherent to a portion of omentum. A young man was under my care for many months, on account of an imperfect transition of the testicle on the left side. The gland moved backwards and forwards through the external abdominal ring. By pressure above, it could be forced down sufficiently to admit of being examined. This testicle was much smaller than the right, which was in the scrotum, and I could distinctly make out a portion of intestine closely adherent, which accompanied the organ in all its movements.

It is probable that the smallness of the opening in the external abdominal ring is sometimes a cause of the detention of the testicle, especially in those cases in which the organ is retained within the inguinal canal. This opinion is supported by the fact, that the testicle is oftener found in the groin than in the cavity of the abdomen. M. Delasiauve mentions a case, in which, he states, the organ was retained by the border of the outer column of the ring.⁵

In cases also of retained testicle, the epididymis is sometimes found partially disengaged from the gland, elongated and extending through the ring into the upper part of the scrotum. I am indebted to Mr. Cock, of St. Thomas's Hospital, for the opportunity of dissecting the parts in a case of congenital inguinal hernia, where this was the case. The lower part of the epididymis and convolutions of the vas deferens were so surrounded with fat and connective tissue as to form a rounded swelling covered with the tunica vaginalis,

¹ *Recherches sur les Causes et l'Anatomie des Hernies Abdominales*, p. 24.

² *Lib. cit.* p. 229.

³ *Edinb. Med. and Surg. Journal*, No. cxc, p. 27.

⁴ *Traité des Maladies Chirurgicales du Canal Intestinal*, t. ii, p. 332.

⁵ *Revue Médicale*, Mars, 1840, p. 363.

which closely resembled a testicle, for which, indeed, it was mistaken in the operation for hernia. The gland was situated just within the internal ring. Cloquet, Follin,¹ and others, have recorded similar observations of displacement of the epididymis. The cremaster being attached to its tail, it is easy to understand how this part may be dragged away from the testicle, and drawn into the scrotum, in cases where the proper transition of the body of the gland has been prevented by a narrow external ring.

Mr. Hunter was inclined to suspect that the fault originates in the testicles themselves. It is difficult to understand how this can be, for as the gland is passive in this process, it can offer no obstacle, except it be too large to pass the opening in the abdominal parietes; whereas, it is admitted that the gland when retained is usually below the natural size. Nor does it appear, that the interruption is owing to any want of proper length in the vas deferens, for in a case of imperfect transition in a boy, whose body I examined, I particularly noticed that this duct was so long as to be doubled on itself, and tortuous, a circumstance which has been remarked in other cases by Mr. Mayo,² Rosenmerkel,³ and others. It may be concluded then, that the causes of a failure in the passage of the testicle are various; that this imperfection may result from want of power, or paralysis of the cremaster muscle; from adhesions retaining the gland within the abdomen; and from a contracted state of the opening of the external abdominal ring.

On the condition of the undescended Testicle.—Mr. Hunter states, that when one or both testicles remain through life in the belly, he believes that they are exceedingly imperfect, and probably incapable of performing their natural functions; and that this imperfection prevents the disposition for descent taking place. That they are more defective even than those which are late in passing to the scrotum, he infers from the circumstance, that in quadrupeds, the testicle that has reached the scrotum is considerably larger than the one which remains in the abdomen.⁴ Mr. Hunter had seen

¹ Archives Générales de Médecine, t. xxvi, 4e série, p. 270.

² Human Physiology, 3d edit. p. 411.

³ Ueber die Radicalur des in der Weiche liegenden Testikels.

⁴ Professor Goubaux has given some interesting details of the structure of testicles retained in the belly of the horse (Recueil de Méd. Vétérinaire Pratique, t. xxiv, p. 131). Besides alterations in the volume and appearance of the testicle, which was as soft as that of the fœtus, M. Goubaux remarked that the sperm found in the vesicula

only one case in the human subject where both testicles continued in the abdomen, but this proved an exception to the above observation, since we are led to conclude that they were perfectly formed, as the person had all the powers and passions of a man.¹ Professor Owen, in commenting upon these observations, states, "It seems remarkable that with this experience Mr. Hunter should have formed from inconclusive analogy, and promulgated, an opinion tending to occasion so much unhappiness as that which attributes exceeding imperfection and probable incapacity of performing their natural functions to testes which in the human subject are retained within the abdomen. That there is nothing in such a situation which necessarily tends to impair their efficiency is evident, from the number of animals in which they constantly form part of the abdominal viscera; and in those in which the testes naturally pass into a scrotum, their continuance in the abdomen, according to our author's own observation, is accompanied only with a difference of size or shape; now we may readily suppose that this may influence the quantity, but not necessarily the quality, of the secretion." There are comparatively few accounts on record of the dissection of detained testicles. In a case, in which M. Cloquet found the left testicle situated within the abdomen, the gland was well formed, and of the same size as the right, which had passed into the scrotum. The parts taken from an apprentice of Sir A. Cooper, who unfortunately committed suicide in consequence of the infirmity, are preserved in the Museum of Guy's Hospital. I have examined the preparation; and the testicles, which are both within the abdomen, close to the internal ring, appear to be nearly, if not quite, the natural size, and it is stated that the ducts contained semen. In a lad, aged nineteen, whose left testicle was found, by Dr. Bright, within the abdomen, near the brim of the pelvis, the gland was considerably smaller than natural, but the ducts and secreting structure were quite perfect.² It would be more satisfactory if we had some account of the condition, as ascertained by microscopical examination, of the secretion found in these retained testicles. These facts, however, do not bear out the views of Mr. Hunter, for it appears that the organs were sound in structure, and, we may

seminalis of the side where the testicle was in the abdomen, did not contain spermatozoa. (Quoted by Dr. Follin.)

¹ Works by Palmer, vol. iv, p. 18.

² Hospital Reports, vol. ii, p. 258.

suppose, were capable of performing their proper functions. Besides, Mr. Hunter himself has adduced one instance of a person, who had full sexual powers, though his testicles remained in the abdomen. Mr. Poland has recorded the case of a man, aged twenty-nine, who was so formed, and had all the signs of virility. He married twice and had two children.¹ Mr. Cock, of Guy's Hospital, has communicated to me the case of a man, about thirty years of age, both of whose testicles were retained in the abdomen. He had a sensual expression of countenance and strong sexual propensities; he had been twice married and had children by both wives; he held a situation at a public house, where he intrigued with the landlady and debauched the barmaid. A youth was under my care many years ago, on account of retained testicle and rupture on both sides, for which I directed the application of a double truss. He has since grown to manhood, and now exhibits the characters of masculine development. Still it must be remarked that in some of the cases noted, the retained testicle was small in size, and in other instances they have also been found defective in structure.

[As an interesting illustrative American case, the following, communicated to me some time since by Dr. Washington L. Atlee, of Philadelphia, is introduced.—W. H. G.]

March 7th, 1835, I was consulted by Mr. E. S., aged about twenty-five years, a strong, muscular man, and hard-working farmer. He had congenital double scrotal herniæ.

On making a careful examination, I discovered on the right side, attached to the lower portion of the hernial tumor, a small body, about the size of a large pea, which I considered to be a rudimentary testicle, and which, on returning the intestine into the abdominal cavity, invariably returned with it. On the left side no evidence of a testicle existed, and I inferred that it had never descended, but remained imprisoned within the cavity of the abdomen. Both herniæ were readily reducible; the inguinal orifices were large and the canals were obliterated by an approximation of the internal and external abdominal rings, so that they assumed the characteristics of that form of hernia, known as Direct Inguinal.

The penis was largely developed, the venereal appetite was active, and the erectile and virile powers were good.

¹ Guy's Hospital Reports, Second Series, vol. i, pp. 162, 163.

On seizing the small pea-like body with my fingers, I found that I could replace the intestine *within* the external abdominal ring, and, at the same time, maintain the small body *outside* of it. I at once determined to treat the case with this object in view. Accordingly I applied a double truss, so as to retain, on the right side, the *intestine within* and the supposed *testicle without* the cavity of the abdomen. On the left side, the truss was applied without reference to the testicle, it never having descended.

The liberated organ soon began to enlarge, and, in the course of a year or two, it assumed the size, shape, and character of a fully developed testicle.

Both herniæ were perfectly cured, the use of the truss was abandoned, the patient married, and the last time I heard of him his wife had presented him two healthy children.]

In examining the body of a robust man, aged thirty-six, I found the right testicle within the abdomen, about an inch and a half from the internal ring. The organ was very small, and weighed only 110 grains; it was healthy in structure, but resembled the undeveloped testicle before puberty. There were no spermatozoa in the efferent ducts, nor in the right vesicula seminalis; the left testicle was unusually large, and in its proper place; the left vesicula seminalis contained spermatozoa, but was smaller than the right.—J. W., a lad, aged sixteen, died in the London Hospital, in a state of universal anasarca. There was no appearance of beard, and only a few hairs were scattered over the pubes. My attention was particularly directed to the state of the genital organs, by observing that the scrotum, which was greatly distended with serous effusion, was not fully developed on the right side. I found the right testicle within the abdomen, about an inch and a half above the internal ring. It was very small, not larger than that of a child two years of age; and on cutting into it, the gland presented the granular appearance usually remarked at that early period. M. Broca, in the dissection of a subject, about thirty years of age, found the left testicle in the iliac fossa a little above the internal ring. It was small and flattened, resembling a haricot bean. The spermatic artery was as fine as a thread.¹ Absence of sexual passion has also been noticed. Mr. Wilson mentions the case of a young man, twenty-five years of age, whose testicles never descended. He had

¹ Archiv. Génér. de Méd. 4e série, t. xxvi, p. 265.

some beard, and not an unmanly appearance; but although an imprudent, and in some things a dissipated person, he had never shown the least desire for women, or disposition for sexual intercourse.¹ Analogy would lead us to expect that the defective development of the gland would be attended with an imperfect gubernaculum; hence the detention of the gland probably results from the *musculus testis* being incapable of withdrawing it from the abdomen. We must not infer that the testicle is defective in consequence of its detention in the abdomen, but we have grounds for presuming that an original imperfection is the primary cause of its remaining in that situation. The knowledge that such an imperfection sometimes exists, however rarely, must always induce us to regard the infirmity, when existing on both sides, with anxiety, which, whilst the patient is young, we have no means of removing. At the adult period, the external characters of the body distinguishing the sex, and the habits, disposition, and desires of the individual, will enable the surgeon to arrive at a correct conclusion as to the efficiency of the retained organs, and to decide on the propriety of marriage.

M. Cloquet gives an account of a testicle found in the left inguinal canal, of a subject forty years of age. It was flattened, elongated, and in a state of atrophy, and so small that it could not be felt externally. The epididymis was situated an inch below the testicle, with which it communicated by fine white transparent vessels, running parallel to each other, and formed by the seminiferous tubes, unravell'd and drawn out. The vas deferens came off from the lower part of the epididymis, and entered the inguinal canal, where it passed by the side of, and internal to, the testicle. The testicle was situated in a hernial sac, which likewise contained omentum.² Dr. Follin carefully examined a testicle retained in the inguinal canal of an old man. Its form was normal, but its thin tunica albuginea contained only a mass of yellow fatty matter and connective tissue. At only one point were there any seminal tubes.³ On inspecting the body of a man who died of phthisis and aneu-

¹ Lectures on the Urinary and Genital Organs, p. 408.

² Lib. cit. p. 23, pl. vii, figs. 2 and 3.

³ Archiv. Génér. de Méd. 4e série, t. xxvi, p. 263. In three instances M. Follin examined the sperm contained in the vesicula seminalis corresponding to the testicle retained in the ring, and found a complete absence of spermatozoa. They were present in the other side. In a fourth case, the spermatozoa were wanting on both sides.

rism of the aorta, at the age of forty-two, I found the left testicle situated just outside the external ring. It was but little more than half the usual size, and surrounded by a tunica vaginalis, adherent in several places. There was no trace whatever of tubuli seminiferi, their place being supplied by a white but rather loose fibrous tissue. The epididymis was reduced to a few fibrous bands, and the vas deferens was small in size: on the injection of the duct with quicksilver, the metal passed no further than the commencement of the epididymis. The other testicle, which was situated in the scrotum, was of less than the average size, but the structure of the gland was normal, and the tubuli were distinctly seen. In the case of an old man already referred to, and in another case of a middle-aged man, who also died of phthisis, in each of which one testicle was situated just outside the external abdominal ring, the organ was found atrophied. Paletta examined the body of a man aged about fifty, who was supposed to be a *monorchis*. The spermatic vessels on the left side, as they approached the pelvis, gradually disappeared, a white transparent process alone remaining, which extended beyond the ring. The vas deferens, which was hollow near the ring, degenerated into a solid compact filament, which united to the remains of the spermatic vessels, and terminated outside the ring in dense cellular tissue near the os pubis, and connected to Fallopius's ligament. This cellular tissue sustained a series of threads of a light yellow color, but not contained in any proper membrane, which might be considered as the remains of the testicle, although the seminal vessels and vas deferens could not be distinctly traced to it.¹

As far as may be judged from these dissections, the testicle is more frequently found imperfect and atrophied when arrested in the inguinal canal than when confined within the abdomen. That such should be the case is not surprising. It has been seen that there is nothing in the situation of the testicle in the abdomen calculated to impair its efficiency, and that its detention there may be owing to causes independent of its state of development. No uneasiness or inconvenience is experienced, nor are the generative functions interfered with under these circumstances. When, however, the passage of the testicle is interrupted in the inguinal canal, the case is very different. The organ is then liable to be com-

¹ Nova Gubernaculi Testis, &c. p. 112.

pressed during any violent action of the abdominal muscles, and even in acute flexion of the thigh, as in walking up stairs, and on bending the body forwards whilst in the sitting posture. It is exposed to injury from blows which, being fixed, it is unable to elude, and to pressure from the frequent manipulation of the surgeon, and the ruder handling of bandage-makers, and often through ignorance, from the application of a truss. It occasionally happens that a testicle, after retention in the abdomen, without any uneasiness having been experienced, passes into the inguinal canal, and sometimes appears at the external ring, playing backwards and forwards from one situation to another. When this is the case, the gland is liable to compression from a sudden contraction or spasm of the abdominal muscles, which gives rise to violent pain and suffering, and a sickening sensation which lasts for some hours unless relieved by the hot bath, fomentations, and opiates.

Richter relates the following case:—"I remember a young man, twenty years of age, who had a small hernia, and no testicle on the left side of the scrotum. The testicle was contained in the abdomen, and sometimes presented at the ring, causing violent pain and symptoms of strangulation, which rendered it necessary to push the gland back again. This object, however, could seldom be accomplished until more than twenty-four hours had elapsed, and emollient cataplasms had been employed. The symptoms immediately ceased when the return of the testicle was effected."¹ I shall presently mention two cases in which occasional compression of a testicle in the groin produced so much suffering as to lead the surgeon to excise the gland in order to afford the patient relief.

We perceive, then, that when a testicle is retained in the groin, there are various circumstances which tend to interfere with its evolution at puberty, to impede its nutrition and to excite inflammation and disease in it, and I have shown from dissections that such results are not unfrequent. A testicle, therefore, situated in the abdomen is in a more satisfactory position, and is much less exposed to injury and disease, than one which has been arrested in the groin. On this account, and as the passage is seldom perfectly accomplished when delayed beyond the age of one year, if the gland has not made its appearance at this period, the well-being of the patient will be best consulted by the employment of some me-

¹ Quoted in Lawrence on Hernia, 5th edit. p. 571.

chanical means to prevent the escape of the organ from the abdomen. A strong reason for adopting this practice is afforded by the great liability to rupture which exists in all cases of the tardy transition of the organ, owing to the persistence of a sac ready prepared for the reception of a protrusion, and in many instances to adhesions between the testicle and intestine or omentum. A hernia may occur whilst the testicle is still in the abdomen, or after it has passed the ring, and the viscera may descend into the scrotum, the gland being detained in the groin. Cases of this kind are embarrassing, as it is impossible to fulfil the two opposite indications of preventing the protrusion of the viscera, and encouraging the descent of the testicle. Many years ago I had under my care a fine child, neither of whose testicles had made their appearance out of the abdomen. When I first saw him, he was about a year old, and had an inguinal rupture on both sides, which descended whenever he cried or struggled. In accordance with the usual practice, I objected to the application of any truss. The parents became anxious and impatient at the annoyance arising from the hernia, and consulted a high authority, who gave similar advice to that received from me. The rupture was consequently left to itself, and the boy restrained from exercise. He was petted, became fretful, and proved a constant cause of uneasiness to the parents. When I last examined him he was eight years of age, and fortunately the rupture on the right side had disappeared spontaneously, and the one on the left protruded very slightly, but there was no appearance of the testicles. Now, if it be granted that a testicle situated in the abdomen is in a better position than one placed in the groin; that it is productive of less inconvenience, and exposed to fewer causes tending to impair its structure; that its subsequent passage, if it ever takes place, is frequently, if not commonly, attended with rupture, it must, I imagine, likewise be admitted, that the advice often given in these cases is unsound and injudicious. In recent years I have invariably advised the application of a truss so as to prevent the descent of the testicle as well as the escape of intestine, which I am sure has contributed much more to the health and comfort of the patient, than leaving him exposed to the inconveniences and dangers of an unrestrained rupture.

In certain cases where the testicle has passed out of the external ring, but without descending fully into the scrotum, complicated

with hernia, a truss with a small pad carefully applied may serve to keep up the rupture, and at the same time prevent the testicle from slipping back into the inguinal canal. When this can be done effectually without risk of the pad pressing on the testicle, it is the practice which should be adopted. But if the testicle is constantly gliding in the way of the pad so as to be exposed to pressure, or if adhesion exists between a portion of intestine and the gland, this treatment is inapplicable, and a truss should be applied to keep the parts if possible within the abdominal cavity.—A middle-aged gentleman consulted me on account of a large scrotal rupture on the right side. A great part, which consisted of bowel, could be returned without difficulty, but a mass remained irreducible unless in company with the testicle, and this was clearly made out to be a large portion of omentum adherent to the gland. On forcing up all the parts, I found it impossible to apply a truss without making pressure on the testicle, and more than ordinary pressure was needed to prevent the protrusion of so great a mass. So much inconvenience and risk attended leaving the rupture unrestrained, that I was compelled to apply a truss without returning the omentum, which was necessarily exposed to pretty strong compression from the truss-pad. The pressure led to his suffering occasionally from a dragging pain referred chiefly to the left side, particularly when he was affected with flatulency or distended bowels. The pain was relieved by easing the truss and rest in the recumbent posture. This gentleman had a varicocele on the left side, and wore a double moc-main lever truss, by which he was enabled readily to moderate the pressure.

It must not be inferred from the preceding observations that the arrival of the testicle in the scrotum is a matter of slight moment; for in most cases of imperfect transition, the gland, whether arrested in the abdomen or groin, is small in size, and it cannot be doubted that the natural situation is the one best adapted for the efficient performance of its functions. Besides, the mind is very readily disturbed by any appearance of imperfection in the organs of generation, and the circumstance of the testicles not having descended is very liable to excite suspicion of impotency. I have already alluded to an instance in which the unfortunate subject of this infirmity, a medical student, committed suicide under such an impression; still, after the age of one year, when there is

scarcely a hope of the passage into the scrotum being fully and completely accomplished, and when the patient is exposed to the inconveniences of a hernia, it is far better to take measures to prevent or remedy these serious and certain evils, than to leave him exposed to them in the expectation of an event which experience proves very rarely occurs, and which if incomplete really places the patient in a worse position than he was in before. The painful feelings resulting from the imperfection may be controlled hereafter by reason and judicious counsel. The surgeon may confidently assure his patient that the detention of the testicles in the abdomen is perfectly compatible with his virility, and in cases where there are no external marks of effeminacy or other grounds for suspecting impotency, and the patient is subject to erections, the imperfection need not be regarded as offering any bar to marriage.

The detention of the testicle in the groin or abdomen must indeed be regarded under any circumstances as an unfortunate infirmity, but particularly when the gland is attacked with disease. One great disadvantage of such an imperfection, which especially attaches to the detention of the testicle in the abdomen, arises from the relation preserved with the peritoneal cavity by which morbid actions originating in the testicle are liable to extend to the parts in the abdomen; and we cannot but view the passage of this gland into the scrotum, and the isolation of its serous investment, as a wise provision, obviating the serious risks to which man would otherwise be liable, owing to the frequency of the diseases of this organ. It will be shown in subsequent chapters that secondary orchitis, or inflammation, commencing in the epididymis, is peculiarly liable to extend to the tunica vaginalis, and that in all diseases of the organ this membrane is very commonly implicated. Now when the testicle is situated in the abdomen, or in the groin, and surrounded by a prolongation of peritoneum, there is no shut sac, no distinct tunica vaginalis, restricting the limits of inflammation when set up, but the disease is liable to affect the contiguous viscera and to extend throughout the abdominal cavity. Such appears to have happened in the following cases:—A lad, ten years of age, was brought to the London Hospital from a distance in the country, dangerously ill. His mother stated that on returning from school four days before, he was kicked in the right groin by one of his schoolfel-

lows. He suffered great pain at the time, and on the following day became very ill. Having continued to get worse, he was brought to the hospital. The boy was evidently dangerously ill from acute peritonitis. He was almost in a state of collapse; his countenance was anxious; his pulse quick, small, and feeble; his abdomen hot, tumid, and extremely tender; and his bowels constipated, but they had been opened since the accident. There was a considerable diffused swelling in the right groin, and the right side of the scrotum was empty. He died in twelve hours after his admission. On examination of the body, marks of extensive peritonitis were found throughout the whole of the abdominal cavity, the viscera being coated with lymph, and a turbid serum abundantly effused. In the right iliac fossa, just beneath the peritoneum, were seen two small abscesses of recent formation. An atrophied testicle was discovered close to the external ring, amongst a mass of connective tissue, infiltrated with pus and lymph. There were indistinct traces of a tunica vaginalis continuous with the peritoneum. I apprehend that, in this case, the blow occasioned inflammation in the testicle and surrounding parts, which, extending to the peritoneum, caused the lad's death. I was summoned one evening to the hospital to see a supposed case of strangulated hernia. On my arrival I found the patient, a stout laborer, aged thirty-three, and a married man, with a considerable swelling in the right groin, which was of an oval form, received a slight impulse on coughing, and was more solid and tender than is usually the case with a rupture. The house pupils had made unsuccessful attempts to reduce the swelling, which gave the man much pain. He stated that he was subject to a swelling in the groin, which occasionally came down in the daytime and disappeared at night, but he had never worn a truss. It descended the evening before, and caused considerable pain; and although it went away during the night, the abdomen had continued painful during the day. Whilst straining himself at work in the evening it again made its appearance; and as it occasioned considerable pain, he came to the hospital for relief. The abdomen was tender on pressure, and he complained of pain in it chiefly in the vicinity of the umbilicus. He did not feel sick, and his bowels had been open twice during the day. The pulse was full and hard. There was no testicle on the right side of the scrotum, but the left was in its natural situation, and of proper size. I concluded that the tumor consisted of a re-

tained testicle which had been accidentally protruded at the external abdominal ring, and become inflamed from pressure, and that the inflammation had extended to the peritoneum, the latter membrane being, however, only slightly affected. I could not quite satisfy myself whether a portion of intestine had accompanied the testicle, though this appeared very probable. I ordered the man to be bled, fourteen leeches to be applied over the swelling, and a brisk cathartic to be given him. He continued in suffering during the early part of the night, but having dropped asleep, he found on awaking that the swelling had disappeared. The bowels were relieved in the course of the morning, but the groin and abdomen continued tender for two or three days. There was still a tendency to reprotusion of the testicle and intestine when the man coughed. A truss therefore was applied as soon as the pressure of it could be borne, which was six days after his admission, when he was discharged.

I have noticed the pain and inflammation liable to arise from the compression to which a testicle is subject when seated in the groin, especially after the development of puberty. The suffering has proved so great in some instances that the patient has been glad to seek relief from an operation. Rosenmerkel relates the case of a man, aged twenty-six, one of whose testicles first made its appearance in the groin at the age of sixteen; it disappeared, and did not trouble him when at rest, but he suffered so much pain from it on taking exercise that he was obliged to forego all active exertion. He was admitted into the hospital at Munich on account of a chronic affection of the throat, and on his recovery Professor Koch proposed to him to undergo an operation for the relief of the testicle, to which he readily assented. The skin over the testicle having been pinched up into a transverse fold, an incision was made from the gland in the groin to the bottom of the scrotum. The parts beneath were next carefully divided upon a director, until a slight fluctuation was detected; a small opening was made in the tunica vaginalis, and about an ounce of serum discharged. The testicle was found of considerable size but soft. On drawing the gland from its position in the inguinal canal, the cord was found convoluted and varicose. The testicle was then placed in a cavity in the scrotum prepared to receive it, and secured there by a suture attached to the septum, to prevent the

gland being drawn up by the action of the cremaster muscle. The wound was afterwards closed with sutures. The testicle showed a disposition to return to its former position, and the cure proved tedious.¹ It does not appear that the operation quite answered, nor was this at all likely to be the case. In retention of the testicle, though the vas deferens is commonly tortuous and capable of elongation, the vessels and nerves of the spermatic cord scarcely admit of a like extension. Besides, in these cases the scrotum is undeveloped, so that there is really no tegumental pouch proper to receive the gland. The operation is not one I should be disposed to practise.

Mr. Hamilton, of Dublin, has related an interesting case, in which the distressing symptoms produced by retention of the testicle led him to excise the gland.²—Mr. W., aged forty-five, had a retained testicle in the right groin. About seven weeks since, whilst lifting a heavy weight, he felt something in the swelling crack, attended with acute pain. This was followed by active inflammation of the gland, which appeared to arise from the testicle having been subjected to severe compression under the tendon of the external oblique muscle. The inflammation subsided under antiphlogistic treatment, but a fortnight had scarcely elapsed when the testicle became again inflamed, and in the short interval of seven weeks he had altogether four attacks of orchitis from the organ being suddenly gripped. Under these distressing circumstances, the removal of the testicle was proposed, and readily consented to by the patient. The gland was lodged in a sac which did not communicate with the peritoneum. Recovery took place in three weeks. The testicle was small in size, and its body was healthy in structure. The commencement of the vas deferens and vasa efferentia were blocked up with yellow deposit. It appears that Sir Philip Crampton, who was consulted in this case, suggested the operation of cutting down to the external abdominal ring, slitting it up, and that portion of the tendinous expansion of the external oblique muscle which forms the anterior wall of the inguinal canal, and which covered the testicle. This proceeding was objected to by Mr. Hamilton, on the ground that it might only prove palliative, for when the wound had healed and cicatrization taken place, the hard cicatrix might be as bad as before. To this I may add the further objection, that weakening the walls of the abdomen in the groin would strongly predispose to

¹ Lib. cit.

² Dublin Quarterly Journal of Medical Science, May, 1852.

rupture.—In January, 1853, Mr. Solly kindly afforded me the opportunity of seeing a case at St. Thomas's Hospital, of detained testicle, for which he considered an operation necessary. The patient was a lad, aged nineteen, and looked pale and anxious. His left testicle was situated just outside the outer ring, and there was a rupture in the inguinal canal, but whether in a sac distinct from the testicle or not, could not be clearly made out. He could not bear any kind of truss either to retain the testicle outside the ring, or within the abdomen, or to restrain the rupture; and he suffered so severely at times from compression of the gland in the inguinal canal that he was unable to earn a livelihood. The removal of the testicle was consequently proposed, and though the patient was informed that the operation could not be done without a certain amount of risk, he readily assented to its performance. The testicle was rather small, but quite healthy in structure; its sac communicated with the abdomen. Peritonitis ensued. This yielded to treatment, but the patient's recovery proved tedious.

Diagnosis in Cases of Imperfect Transition of the Testicle.—A testicle retained in the groin at the external abdominal ring, or immediately below it, is liable to be mistaken for a bubonocoele. It often occurs that it can be pushed back partially, or completely, into the inguinal canal, but that it soon reappears when the pressure is removed. There is then a swelling in the groin, admitting, like a hernia, of replacement, which might at first lead to the suspicion of rupture. The size, form, and solidity of the tumor, however, which receives no impulse on coughing, the peculiar sensation produced by pressure, and the absence of the testicle from the scrotum, are sufficient to establish the true nature of the case, and to prevent it from being mistaken for either an intestinal or omental rupture. More difficulty is experienced in making the diagnosis, when an imperfect descent of the testicle is combined, as it often is, with a congenital rupture; and the case may be further complicated by the tunica vaginalis containing fluid, which can be passed up into the abdomen, but which returns when the pressure is removed. But, even in these cases, the empty state of the scrotum, and the peculiar pain excited by pressure on the gland, are usually sufficient to prevent the surgeon from committing any serious error. When a testicle detained in the groin becomes inflamed, the sickness and pain in the abdomen consequent upon the orchitis, tend very much

to complicate the diagnosis, which is liable to be rendered still more perplexing by the effusion of blood or serum into the scrotum, concealing the absence of the testicle, so that no slight skill and judgment are required to solve the difficulties of the case, as will appear from the following example:—Mr. Pott was sent for in a great hurry to perform the operation for bubonocoele on a young man, who was suffering most acute pain in the groin and back. It appeared that, the day before, he struck his groin against a piece of timber, which gave him such exquisite pain that he fainted away, and his groin became immediately swollen to a very considerable degree. An apothecary bled him and poulticed the tumor, but he passed the night without sleep, and in great agony. The next morning he stated that he had long had a rupture on that side which had never perfectly returned. He was again bled, and some pains were taken to return the rupture. As the attempts produced great increase of pain, they were desisted from, and two glysters and a purge were given, but without effect. The pain was exquisite, the patient very sick, and the groin and scrotum were much swollen and very hard. The general appearance and figure of the tumor did not appear like that of a bubonocoele. Instead of pointing obliquely from the ilium towards the pubes, it lay as it were across the groin; the scrotum was full and large, but much harder than Mr. Pott had ever found a piece of intestine. The discoloration was not at all like the effect of mortification, but had all the appearance of ecchymosis. The man had not had a fair stool for three days; he had been very sick, and had vomited; his belly was tight, hard, and painful, and his pulse much too quick; very little information was to be gained from examination of the tumor, for the pain was so exquisite that he could not bear the slightest touch. On inquiring further concerning the rupture, it was ascertained that he had worn a truss the first four years of his infancy, but that it never kept the gut totally or perfectly up; and that, as he grew bigger and ran about, he was obliged to leave it off on account of the pain it gave him; that since, little or no alteration in the tumor had been observed, and that it had never given him any trouble or uneasiness, if he did not handle it, or kept the waistband of his breeches and his watch from pressing it. All this being far from satisfactory, Mr. Pott determined before attempting any operation, to try the effects of a brisk cathartic, which produced a plentiful discharge, and relieved all apprehensions

of stricture. Under fomentations and poultices, &c., the tumor subsided, and in about seven or eight days the scrotum was so unloaded as to permit an accurate examination, by which it was ascertained that it contained no testicle. Upon mentioning this circumstance to the patient, he said that he never had one on that side. This declaration was a solution of all difficulties, and of all the appearances. When all the effects of the blow were removed, there appeared in the groin a testicle of natural size and figure, which by being much bruised had caused all the mischief.¹ Delasiauve relates a case in which a testicle retained at the groin, and inflamed, was mistaken for a strangulated hernia, and actually operated on. When the nature of the case was ascertained, the gland was extirpated.² Dupuytren has also recorded an interesting case of hydro-sarcocele of the left testicle coupled with hernia, consequent upon a late descent of the gland. The case was mistaken for simple hernia, and the patient had worn a truss. The diagnosis was extremely difficult. The case was operated on; and after opening the tunica vaginalis, and letting out eight or ten ounces of fluid, he extirpated the enlarged and indurated testicle. The patient did well.³ It may seem unnecessary to direct the practitioner in all doubtful cases to make a careful examination of the scrotum. Yet it is surprising how apt the absence of the testicle is to be overlooked, the deficiency not being ascertained until all attempts to reduce the supposed bubonœcele have failed, and the patient himself being often unaware of anything unusual in the state of the parts. Several cases in which this important point was overlooked have come to my knowledge.

A testicle retained in the groin when inflamed, is liable to be mistaken for a bubo, the prominent oval swelling communicating a deceptive feeling of fluctuation and being attended with pain; the skin over it occasionally exhibiting even a slight red blush, and the tumor being seated in a region where bubo constantly occurs and suppurates. It is related that Ricord, of Paris, was once very nearly deceived by a case of the kind, and even called for a knife to open the supposed abscess, but a re-examination of the tumor having led to the discovery of the absence of the testicle on that

¹ Lib. cit. p. 352, case 1.

² *Revue Médicale*, Mars, 1840.

³ *Leçons Orales*, t. i, also Dupuytren's *Surgical Works*, Trans. Sydenham Society 1853-4, p. 347.

side of the scrotum, he made further investigation, and detected the true nature of the case.¹

Passage of the Testicle into the Perineum.—Mr. Hunter first observed that the testicle, in changing its situation, does not always preserve a proper course towards the scrotum, there being instances of its taking another direction and passing into the perineum. How this is brought about, he remarks, it is difficult to say: it may possibly be occasioned by something unusual in the construction of the scrotum, or more probably, by a peculiarity in that of the perineum itself. For it is not easy to imagine how the testicle could make its way to the parts about the perineum, if these were in a perfectly natural state. He met with two instances of this imperfection. A surgeon gave the following account of one of the cases: “The boy is about twelve months old; his right testicle is situated about an inch below the termination of the scrotum, and half an inch on the right side of the centre of the rapha perinei, where a kind of pouch is formed of the common integuments, without the least rugous or scrotal appearance on its surface. It is perfectly detached from the scrotum; nor can the testicle or spermatic process be at any time felt in any part of the scrotum, though I can readily make the testicle pass from its situation quite up into the groin; but immediately upon removing my hand, the testicle falls down into its pouch; and I can trace the spermatic cord from the body of the testicle up to the ring, running about a fourth of an inch on the right side of the scrotum. The scrotum on each side appears perfectly formed, and the left testicle is *in situ naturali*.”

Many years ago, a little boy, one of whose testicles had thus deviated from its proper course, was brought to the London Hospital. The gland was lodged in the perineum at the root of the scrotum. M. Ricord met with this singular anomaly in two instances. M. Vidal (de Cassis) observed it in two brothers: their father was exempt from it. The testicle abnormally placed was smaller than the other.² Mr. Ledwich recently met with this abnormality in dissecting a subject, aged thirty-five. The scrotum was deficient on the right side, and the right testicle was found lying in the perineum anterior and internal to the ascending ramus and forepart of the right tuber ischii, an inch in front of the anus.

¹ Provincial Medical Journal, July, 1843.

² *Traité de Pathologie externe*, t. v, p. 432, 2ème edit.

The organ was extremely mobile, and could with facility be forced upwards and forwards into the scrotum, but readily relapsed into its former position. It was small and soft, but its ducts contained spermatozoa.¹ This dissection throws no light on the cause of the deviation of the gland from its usual course. The irregularity is exceedingly rare, and the above cases are all with which I am acquainted.

This peculiar conformation is attended with great inconvenience and risk of injury to the testicle, when the subject of it assumes the sitting posture, and rides on horseback. Mr. Hunter advised that the organ should be supported in a situation near the groin, by the application of a bandage that might hinder its descent into the perineum, by which the parts might be in time so consolidated as to retain it by the side of the scrotum. In one of the cases which occurred to M. Ricord, the patient was affected with gonorrhœa, and the gland becoming inflamed, produced a perineal tumor, which was exquisitely painful, fluctuating, and about the size of a pigeon's egg; the skin adhered to it. It was at first taken for an abscess, and Ricord was about to open it, when examination of the scrotum led him to the discovery that one testicle was absent.²

Passage of the Testicle through the Crural Ring.—M. Vidal relates the case of a man, one of whose testicles, instead of passing out of the abdomen at the inguinal canal, made its exit at the crural ring. The organ was mounted upon the abdomen like a crural hernia. A portion of intestine traversed the inguinal canal, forming a rupture on that side.³ I know of only one other instance of this anomaly, which is reported by Eckardt. In this case, the testicle passed out at first through the inguinal canal, but having been returned by the patient into the abdomen, it subsequently escaped at the femoral ring.⁴

The following deviation was met with in the body of a healthy man in the dissecting room of the London Hospital: The right testicle was small and not developed, and was lodged in the upper and inner part of the thigh, about three inches below Poupart's ligament. It was found behind the saphena vein, just in the open-

¹ Dublin Quart. Journ. of Medical Science, Feb. 1855, p. 76.

² Provincial Medical Journal, 1843, p. 264.

³ Ibid. 1843, p. 431.

⁴ Loder's Journal für die Chirurg. ii, Bd. 1, Stf. s. 187.

ing of the fascia lata, the cord, which was long, encircling the vein. The right half of the scrotum was deficient.

SECTION IV.

INVERSION OF THE TESTICLE.

It sometimes happens that the position of the testicle in the scrotum is reversed, so that the free surface presents posteriorly, and the epididymis is attached to the anterior part of the gland, instead of to the posterior. The first case that I met with was that of a man who had a swelling of the right testicle, which puzzled his medical attendant. On examination I found this to be the epididymis thickened from chronic inflammation. I was able clearly to trace the vas deferens proceeding to it along the front of the scrotum. The body of the testicle was unaffected, and its posterior edge was quite smooth and regular. The disposition of the left testicle was normal. On visiting Paris, in 1849, I was shown by M. Ricord a case of epididymitis on the left side, in which the gland was thus inverted. He informed me that he had often met with this arrangement. I have since had several patients under my care, one of whose testicles was thus inverted. Three were lads in the London Hospital affected with epididymitis. Another was a gentleman who consulted me for chronic orchitis confined to the body of the testicle. The epididymis being unaffected, the inversion was less perceptible than in the preceding cases. I have also observed this malposition in the dissection of a left congenital inguinal hernia which had been operated on with a fatal result. M. Maissonneuve, in a thesis published in Paris, in 1835, I believe, first called attention to this irregularity, which, he states, he had met with many times upon the dead body and upon the living; and he mentions, what I remarked myself in all the cases in which I have noticed the inversion, that it was confined to one side.

It is of considerable importance that surgeons should bear in mind the liability of the testicle to this irregular disposition, or they may make serious mistakes in their diagnosis and treatment of the diseases of the gland. In hydrocele occurring to a testicle so disposed, the testicle being seated in front of the sac would be particularly exposed to injury in tapping unless its position were previously

detected; and in treating of hæmatocoele I shall have occasion to notice instances in which the malposition has led to important consequences.

CHAPTER II.

ATROPHY OF THE TESTICLE.

THE testicles, like other organs formed for the exercise of temporary functions, do not arrive at a perfect state of development until a certain period of life, after which their activity ceases, and they become gradually and imperceptibly diminished. Thus we find that in early life they are small in proportion to the size of the body as compared with their condition at puberty, and that as old age advances and the generative functions cease to be called into action, they undergo a diminution in size, their vessels grow less, the seminiferous tubes become small and contracted, and partially obliterated, their place being supplied by fatty matter.¹ In the lower animals these changes are far more remarkable than in man, for as the functions of the testicle are exerted only at stated periods of the year, as the rutting or copulating season advances these organs rapidly increase in bulk, and in its decline undergo a proportionate degree of wasting. In man, it sometimes happens that the testicles do not acquire their proper size at the usual period, their development being from some cause or other arrested; and also, after the organs have arrived at their full and perfect growth, that occasionally one or both suffer a premature decay. Under the head, then, of Atrophy of the Testicle I shall consider: 1. Arrest of Development; and 2. Wasting.

SECTION I.

ARREST OF THE DEVELOPMENT OF THE TESTICLE.

If the congenital lesions to which the testicle is liable had not been previously treated of, the cases of absence of the organ already

¹ In the testicles of old men the tubules are commonly found loaded with a dark granular substance, the result of fatty degeneration.

described might be correctly referred to the present head, as the deficiency in these cases was no doubt the result of an arrest in the early development of the organ. But the cases that I am now about to consider are those in which the subsequent evolution which the testicles undergo at puberty is delayed beyond the usual period, or never takes place at all. Mr. Wilson relates a curious instance of his having been consulted by a gentleman, twenty-six years of age, on the propriety of entering the marriage state, whose penis and testicles very little exceeded in size those of a boy of eight years of age. He had never felt the desire for sexual intercourse until he became acquainted with his intended wife; since that period he had experienced repeated erections, attended with nocturnal emissions. He married, became the father of a family; and these parts, which at six-and-twenty years of age were so much smaller than usual, at twenty-eight had increased nearly to the usual size of those of an adult man.¹ Mr. Wilson mentions this singular case, as it will admit of question whether the parts alluded to became properly formed as to size, and possessed of the power of secretion, in consequence of being, although so late in life, influenced by the passions excited by attachment to a particular female; or whether the enlargement and proper action of the parts beginning, occasioned such passion first to exist. He thinks the probability in favor of the former supposition, in which opinion I certainly concur. Lallemand mentions having seen a man about thirty years of age, extremely fat, and without a beard or hair on the pubes, whose penis and testicles appeared to belong to a child of from seven to eight years: he had never experienced erections or venereal desires.² A young man died in the London Hospital of disease of the heart. He was seventeen years and nine months old: the body measured five feet five inches in height, and was plump and well formed. There was no appearance of beard, or whiskers, or of hair on the pubes. The penis and testicles were very small, not larger than they are usually found in boys of three or four years of age. The testicles were about equal in size, and one of them weighed only two scruples and one grain. Both organs were normal in structure, appearing like the glands in early life, when the tubular structure is very indistinctly

¹ Lectures on the Urinary and Genital Organs, p. 424.

² Des Pertes Seminales Involontaires, t. ii, p. 380.

developed. No spermatozoa could be detected. These were clearly instances of arrest of development of the testicles.

As the testicles are chiefly excited to action by an operation of the mind, it is easy to understand that they may sometimes remain undeveloped owing to defective organization of the brain, an absence of sexual desires being invariably remarked in these cases. Cases of wasting of the testicles after injuries of the head, and the frequent absence of the venereal appetite in cretins and idiots, tend to strengthen this opinion. The following are marked examples of defective development of the sexual organs accompanied with imperfection of the brain. An idiot, aged nineteen, subject to epileptic fits, died of typhus fever in the Hackney Union. The youth was of short stature, and the form of the body was not indicative of either sex, but the contour was rounded as in the female. There was no appearance of hair about the face or pubes. The abdomen and other parts were covered with a thick layer of fat. The penis and scrotum were remarkably small; not larger than they are usually found in a child two or three years of age. Both testicles were in the scrotum, but they were of very diminutive size; the right weighed less than a drachm, and the left not more than twenty-three grains. The right gland had descended a very little way below the abdominal ring. The glandular structure and epididymis of both testicles were indistinct, and the vasa deferentia also extremely small. Nothing remarkable was observed in the structure of the brain. Mr. Hovell, the surgeon of the union, also showed me another inmate of the same workhouse, a lad aged nineteen, and of weak mind, whose penis and testicles did not exceed in size those of a boy seven or eight years of age, and who had only a few scattered hairs on the pubes. In the Museum at Fort Pitt, Chatham, are preserved two undeveloped testicles about the size of those of a child six months old, but healthy in structure, which were taken from a lunatic soldier, fifty-eight years of age. He had been in confinement for many years on account of a homicide, after a trial for murder, of which he was acquitted on the plea of mental imbecility supposed to be congenital. His person was diminutive, his voice effeminate, and the beard wanting. His penis was small, and there was an appearance of mammae of considerable size. He acknowledged that he had never experienced any inclination for sexual intercourse.

In treating of the imperfect transition of the testicle, I have remarked that this gland, when retained in the abdomen or inguinal canal, does not in general acquire its complete state of development, and that, though frequently capable of secreting, it is commonly small in size. I have also noticed, in cases of congenital inguinal hernia, that the testicle, even in its natural situation, was not of its proper size at the period of puberty; so that when the infirmity existed on one side only, the testicle was not more than half or two-thirds the size of the other gland. The arrest of growth in this latter case may be in some degree attributable to the combined effects of the pressure of the protruded intestine on the vessels of the cord, and to the obstruction to the circulation caused by the application of trusses and bandages to the groin.

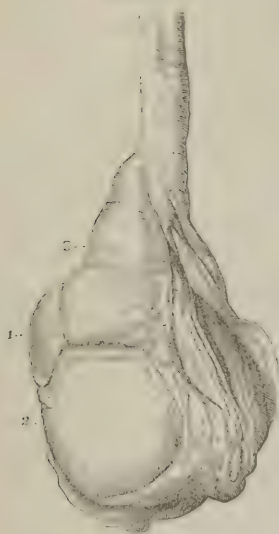
SECTION II.

WASTING OF THE TESTICLE.

In investigating the alterations in the nutritive condition of the testicle, it is very desirable to fix, if possible, some standard by which they may be estimated. The size of the gland is neither uniform nor conveniently appreciated. Its weight, likewise, varies so much in different persons, and in the same individual at different periods, according as it has lately exercised its functions or remained inactive, and as it is full of semen or empty, that it is scarcely possible to determine on any accurate standard of this kind. According to Meekel, the weight of the testicle, including the epididymis, is only four drachms, and according to Sir A. Cooper about an ounce. The former estimate is certainly too low, and the latter too high. I have found the mean of these two estimates, viz., six drachms, to be the ordinary weight of the sound testicle of a healthy adult. In the most lingering cases of phthisis and in other emaciating diseases the organ was never found to weigh less than three drachms. I should consider, therefore, the testicle of an adult weighing less than three drachms as in a state of atrophy.

A testicle in an advanced state of wasting, not arising from disease of the gland, usually preserves its shape, but feels soft, having lost its elasticity and firmness. The tunica albuginea is thin. The

Fig. 10.



1. Epididymis. 2. Body of testicle.
3. Fatty deposit.

texture of the gland is pale and exhibits few bloodvessels, the tubuli and septa dividing the lobes are indistinct, and the former cannot be so readily drawn out into shreds as before. The epididymis does not usually waste so soon nor in the same degree as the body of the testicle. It sometimes, however, loses its characteristic appearance, and I have even found it reduced to a few fibrous threads. The fluid pressed out of the wasted testicle and epididymis is entirely destitute of spermatic granules and spermatozoa. In many instances adipose tissue is deposited behind the tunica vaginalis, and encroaches on the epididymis and posterior part of the testicle. Fatty matter is also found in the glandular substance.

Fig. 10 represents the left testicle of its exact size taken from a man aged forty-six, who died of dropsy consequent on disease of the kidneys. The gland was wasted to one-fifth its natural size. In addition to the presence of adipose tissue beneath the visceral portion of the tunica vaginalis, I recognized a quantity of yellow matter irregularly disposed amongst the wasted tubuli. This matter on examination proved to be fat-globules, and readily dissolved on the application of ether. I have already (p. 73) quoted a case in which one of the testicles detained in the inguinal canal of an old man was composed almost entirely of fat. The structures composing the spermatic cord undergo a corresponding diminution; the cremaster muscle disappears, the nerves shrink, and the vessels are reduced in size and number. The vas deferens, though small, can generally be injected with mercury as far as the commencement of the epididymis, and sometimes the metal reaches the vasa efferentia.

A testicle, atrophied from disease, is not only of diminished size and weight, but is often altered in shape, being uneven and irregular, and sometimes of an elongated form. The surfaces of the tunica vaginalis are adherent, and its cavity is partly or entirely

obliterated. There is no, or very little, trace of the proper glandular structure, the organ being converted into fibrous tissue of a firm texture, the tubuli themselves undergoing this transformation. The testicle loses also its peculiar sensibility to pressure, but is sometimes the seat of morbid sensibility. The epididymis undergoes similar changes, but usually to a less extent than the body of the gland.

All those causes which produce decay in other parts likewise occasion wasting of the testicle. Thus an impeded circulation, pressure, want of exercise, and loss of nervous influence, have been noticed as causes of atrophy of this gland. To these must be added certain causes which specially affect the testicle. The following case, related by Mr. Wardrop, is a good example of atrophy from defective nutrition. A person, both of whose testicles were completely absorbed, nothing being felt in the scrotum but a loose vaginal coat, died of an aneurism of the aorta, formed at the origin of the spermatic arteries, both of which were obliterated.¹ A ligature on the spermatic artery is sufficient to cause a total decay of the testicle, which induced the celebrated Harvey² to propose its application for the removal of a certain form of sarcocele; a suggestion, the credit of which has been wrongly given in recent years to C. J. Maunoir, of Geneva. In varicocele the interruption to the circulation consequent on the dilatation of the spermatic veins impairs the nutrition of the testicle, and causes more or less diminution in its size. In these cases the testicle on the side affected, the left, is almost invariably smaller than the right, whereas in a healthy state of the parts, the left is usually the larger of the two glands. The influence of pressure in causing partial atrophy of the testicle, is sometimes remarked in old cases of hydrocele and hæmatocele, in which the gland has been long subjected to compression from the retained fluid.

It has been said that the testicles waste in those persons who strictly adhere to their monastic vows, but I am not aware that there is sufficient authority for this remark. In persons who marry, after many years of abstinence from sexual intercourse, the testicles undergo a certain degree of enlargement. These glands naturally

¹ Note to his edition of Baillie's Works, vol. ii, p. 315.

² Anatomical Exercitationis concerning the Generation of Living Creatures. Lond. 1653, pp. 113, 114.

remain somewhat small when not called upon to exercise their functions; but whilst they are in a condition for secretion, and can be further developed if excited, this state cannot properly be regarded as morbid atrophy. It is a great error to suppose that sexual connection in early life is essential for their preservation. When the excretory duct of the testicle is obliterated or obstructed, the semen secreted under excitement having no outlet encumbers the gland for a time, but afterwards becomes absorbed, and, it is said, that the useless organ decays. This, however, I have shown in a preceding chapter to be by no means a common result.

As examples of atrophy of the testicles from impaired nervous influence, may be adduced cases of paraplegia, in which these organs have been known to waste. Portal mentions the case of a robust man, aged thirty-five, who was attacked with painter's colic, attended with great debility of the lower extremities. The testicles diminished considerably; and although he afterwards recovered from the paralysis of his limbs, these glands always remained wasted; and the man was incapable of the act of generation.¹ In the 20th volume of the "Medical and Physical Journal," there is an account of a case of recovery after fracture, with partial dislocation of the first and second lumbar vertebræ, followed by paraplegia, in which, three years afterwards, the testicles were found entirely obliterated. I examined the testicles of a man, aged thirty-one, the lower half of whose body had been completely paralyzed after an injury of the middle dorsal vertebræ, nearly two years before. They were sound in structure. One weighed upwards of two drachms; the other a few grains less. No spermatozoa were found. It has been stated that the testicles sometimes waste from injuries, or from compression of the spine at the origin of the spermatic nerves. In a man who had received a blow on the lumbar region, the testicles gradually wasted away.²

The most common cause of atrophy of the testicle is the disturbance in its organization consequent upon inflammation. As the inflammatory process ceases, the enlarged gland not only becomes reduced to its original size, but it sometimes slowly but steadily diminishes, till at length very little vestige of it remains. Mr. Hunter has related three cases,³ and Sir E. Home, some others, in which

¹ Cours d'Anatomie Médicale, t. v, p. 434.

² Baillie's Works, by Wardrop, vol. ii. p. 315. ³ Treatise on the Venereal Disease.

the testicle decayed in this way. I have myself met with several instances of atrophy arising from this cause, and there are few surgeons of experience who have not witnessed cases of the kind. Wasting of the testicle has been observed to occur after an attack of orchitis in mumps, arising, as it is supposed, from the translation of inflammation from the parotid to the testicle. Two cases of cynanche parotidea in the adult, in which atrophy took place in the gland chiefly affected, are related by Dr. R. Hamilton.¹ I have witnessed one case, in which the patient attributed the loss of the gland to an attack of mumps in his infancy. Wasting is more liable to occur after inflammation of the body of the gland than after consecutive inflammation, in which the epididymis is the part chiefly affected. One or both testicles have been found to waste in persons who have indulged too much in sexual intercourse, or been addicted to onanism. Baron Larrey met with several cases of atrophy from excessive venery, and abuse of strong drinks, amongst the soldiers of the Imperial Guard.² Sir B. Brodie has recorded two cases in which wasting was occasioned by over-excitement; in one from onanism, in the other from sexual intercourse.³ I witnessed an instance of total atrophy of the left testicle, which was ascribed to excessive masturbation. In this case, and probably in some of the others just quoted, the wasting was preceded by an attack of inflammation, induced by the inordinate excitement. The atrophy, however, cannot always be referred to inflammatory action. There must be some further cause in operation to account for the change, as in the following instance in which both glands suffered:—H. C., a fair-looking, but apparently a strong and healthy young man, consulted me in consequence of wasting of his testicles and subsidence of all sexual feeling. He stated that both his testicles were formerly of full size. He had been addicted to excessive masturbation, and had abandoned the practice only a year previously. He had had connection with women at different times. About four years back he strained himself in lifting a heavy weight; shortly afterwards, the right testicle swelled and became painful, and since this attack the gland has gradually wasted, and, when I saw him, was no bigger than a pea. After straining himself again a year ago,

¹ *Philos. Trans. Edinb.* vol. ii, art. ix, p. 59.

² *Mémoires de Chirurgie Militaires*, vol. ii, p. 66.

³ *London Medical and Physical Journal*, vol. lvi, p. 297.

the left testicle became swollen and inflamed, and afterwards began to waste. On examination I found it about the size of a pigeon's egg and very firm, but free from the irregularities and indurations commonly met with after severe orchitis. The vasa deferentia were of the proper size and consistency. The young man had the sleek, fat appearance of a eunuch, and had no beard or whiskers. He was very uncomfortable in mind respecting his state. The last time he attempted connection was three months back, but no emission followed. We can easily understand that violent inflammation may disorganize a testicle and lead to its wasting, but in this case the orchitis was not of an active character, and left behind no changes indicative of its previous existence. The following case, communicated to me by my colleague, Mr. Adams, is of a somewhat similar character to the preceding. He was consulted by a gentleman in consequence of wasting of both testicles, which were reduced to the size of large beans. The only cause to which he could attribute the wasting, was over-excitement in dalliance with a lady with whom he was prevented having more intimate relations. His testicles had been painful, but there were no marks to indicate that the glands had been the seat of inflammation. The active secretion and overloaded state of the organs without the natural relief, must have injuriously affected their nutrition.

It is a common belief, that wasting of the testicle is liable to be induced by the long-continued use of iodine. I have not met with any instance of it, and there are few cases in which the evidence is such as to render it at all clear that the decay of the gland was really occasioned by the remedy. M. Cullerier has published the case of a young man who took from twenty-five to thirty drops of the tincture of iodine for a period of three months, for the cure of an obstinate gonorrhœa. This was followed by a state of impotency and partial wasting of the testicles, which lasted a twelvemonth, and the organs never regained their former size and vigor. M. Cullerier mentions another case of temporary loss of virile power occurring from the use of the iodide of iron.¹ I feel convinced, however, that if iodine produces wasting of the testicle at all, it does so so rarely, that the liability cannot be regarded as any objection to the free and long-continued use of this valuable remedy.

Atrophy of the testicle has been remarked in elephantiasis of the

¹ Mémoires de la Société de Chirurgie de Paris, t. i.

Greeks, a disease in which tubercles are developed in various parts of the skin. Dr. Adams, in an account of the cases of that disease observed in Madeira, states that all those who were attacked with it before the age of puberty, never acquired the distinguishing marks of that change in the constitution, and their testicles diminished in size, and that in those affected later in life the testicles became atrophied, and they lost the power of procreation.¹ Mr. Peacock also noticed a wasting of the testicles in several cases of elephantiasis in the Leper Hospital of Colombo, in Ceylon.² A similar condition of these glands was remarked in a case of this disease, so rare in this country, narrated by Mr. Lawrence,³ and also in another case at the London Hospital, which I recorded many years ago.⁴ In a confirmed case, however, of this disease, in a boy, aged thirteen, who was under my care in the year 1849, there was no diminution in the size of these glands.

Wasting of the testicles is liable to occur after injuries of the head. Some years ago I saw a man who had met with an injury of this description, which had been followed by wasting of the testicles, and the development of tumors on each side of the chest resembling mammæ. He was about fifty-nine years of age, a married man, and the father of several children. He had belonged to the legion in the Queen of Spain's service. About two years and a half previously, in an attempt to jump over a trench, he fell backwards and injured the posterior part of his head. Whilst on the ground he received a bayonet wound on the side, and a sabre cut on the forehead. He recovered from these injuries and returned to England. Since the accident he had completely lost his virility. He had no desire for sexual connection; his penis had dwindled in size; his right testicle had gradually wasted, and was no larger than a horse-bean, and the left gland was also a good deal diminished in bulk. The skull at the occiput seemed somewhat flattened. Baron Larrey records the case of a man who was wounded in the back of the neck by a musket-ball which grazed the inferior occipital protuberance. He recovered from the injury, but the testicles were reduced to a state of atrophy, and the penis shrunk and re-

¹ On Morbid Poisons, p. 265.

² Edinb. Medical and Surgical Journal, vol. liii, p. 139.

³ Medico-Chirurgical Transactions, vol. vi, p. 214.

⁴ Vide Medical Gazette, vol. vii, p. 447.

mained inactive. He also relates the case of a man of strong constitution and vigorous passions who received a sabre wound which cut off all the convex projecting part of the occipital bone, and exposed the dura mater. The patient lost the senses of sight and hearing on the right side, and his testicles sensibly diminished, and in fifteen days were reduced, especially the left, to the size of a bean.¹ Lallemand had under his care a man thirty years of age, who, in the expedition to Algiers, had received a sabre wound at the nape of the neck. His testicles were wasted, and venereal desire as well as erections had entirely ceased.² We cannot doubt that in these cases the loss of sexual desire, and the wasting of the testicles, were the direct results of the injury to the brain, and they go far to prove the essential dependence of the functions of these glands upon the cerebral organ. The physiologist cannot fail to notice the rapidity with which the atrophy is stated in some of the cases to have succeeded the injury and the extent to which it proceeded. The withering of the testicles, was, indeed, so remarkable, that it can be attributed only to the sudden and complete extinction of the sexual instinct resident in the brain, and (if I may so express myself) to the immediate impression on the system of the future uselessness of these organs. In old age and in lingering diseases the decay of the testicles is extremely slow and gradual, and is never carried to the extent observed in cases of injury to the brain. In fact, men have survived the power or desire of performing the sexual act many years without the testicles being materially reduced in size. We have seen, too, that in the lower animals the testicles have been rendered useless by interrupting the vasa deferentia, without any such striking effect being produced on the glands as occurred in these cases of cerebral injury.

An investigation of the causes of atrophy of the testicle is sufficient to show that in many of these cases the surgeon has little power by any method of treatment to promote the development or arrest the decay of this organ, these changes being the result of actions beyond his reach or control. In certain cases, as in atrophy from pressure, or from an impeded circulation, and in some instances of decay from injuries of the head, and affections of the brain, we may by judicious measures assist in retarding the wasting

¹ *Mémoires de Chirurgie Militaire*, p. 262.

² *Pertes Séminales Involontaires*, t. ii, p. 41.

process. A knowledge of the circumstances which conduce to this change will indicate the means required to check its progress. The treatment suitable in some of these cases will be considered in the chapter on Functional Disorders of the Gland.

CHAPTER III.

INJURIES OF THE TESTICLE.

ALTHOUGH the testicles, owing to their exposed situation, are more liable to injury than any other glandular organ, they are preserved in a remarkable degree from the effects of external violence by their great mobility and capability of eluding pressure, and the nature and strength of their protecting tunics.

SECTION I.

CONTUSIONS AND INCISED AND PUNCTURED WOUNDS.

Contusions.—The testicle is in danger of being bruised in the exercise of riding on horseback, by the organ being struck against the pommel of the saddle, and many of the diseases of the gland are found to originate in this accident. It is sometimes forcibly compressed between the thighs, and is occasionally contused by a kick or blow. This injury usually occasions slight extravasation of blood within the sac of the tunica vaginalis, or between this membrane and the tunica albuginea. The effusion sometimes infiltrates the cord, giving rise to diffused hæmatocele of this part; and when the contusion has been particularly severe, the extravasation has been found to extend along the cord even to the kidney. A case of contusion of the testicle, in which the extravasation reached as high as the diaphragm, is related by Petit.¹ The tunica albuginea is so dense and strong that it is rarely ruptured, and it protects in a great degree the glandular structure from the effects of this injury.

The consequences of a contusion of the testicle are soon felt, and are often severe; the immediate effects of the injury resembling a good deal the symptoms produced by an injury of the vis-

¹ *Traité des Maladies Chirurgicales*, t. ii, p. 479.

cera of the abdomen, owing to the connection of its nerves with those of the organs in the abdominal cavity.¹ The patient instantly experiences acute pain, which extends up to the loins, and forces him to bend his body forwards for relief; and he is seized with a sickening sensation, often accompanied with syncope, vomiting, and cold perspirations. But these symptoms are transient; and in many instances, after recovery from the first effects of the injury, no further ill consequences are experienced; the effused blood is removed, and the testicle, after remaining tender for a few days, is gradually restored to its former healthy state. The only treatment required in these slight cases is rest, support to the organ with a handkerchief or suspensory bandage, and the application of a cooling lotion. In other instances, the contusion is followed by severe inflammation, which seriously injures, and sometimes completely destroys, the organ. Frequently the injury lays the foundation of chronic disease, which is slowly developed shortly after the accident. So complete are the disorganizing effects of a severe contusion on the gland, that squeezing the testicle was one of the modes adopted formerly in the Oriental courts for emasculating the attendants of the harem;² and I am informed that a similar plan of castrating bucks is sometimes resorted to by park-keepers in this country, and that in the agricultural districts, calves and lambs are occasionally treated in the same way. Dupuytren states, too, that in Normandy, horses are deprived of their testicles by compression.³ This, however, is not a very sure way of emasculating, as some of the tubuli are liable to escape injury, and the effects of the subsequent inflammation.

Punctured and incised wounds of the testicle are not in general followed by severe results. The organ has often been injured accidentally in operations with a trocar or lancet, and the wound has afterwards readily healed. Dupuytren relates that in tapping a

¹ An interesting case showing the sympathy of the vital organs with the testicles is recorded by Dr. Schlesier. A healthy man engaged in a fray in the dark was suddenly heard to shriek out: he fell in convulsions, and died in five minutes. On examination the only injury found was the rupture of both the spermatic arteries and veins at the internal rings, produced by the scrotum and testicles having been seized and pulled down by one of those with whom the man was fighting. Quoted by Paget in Brit. and For. Med. Rev., Jan. 1844, from Casper's Wochenschrift, Oct. 22, 1842.

² A person rendered a eunuch in this way was termed *θλαδίας*.

³ *Leçons Orales*, t. i.

hydrocele in which the testicle was in front, after piercing the gland, he injected the sac three times. The inflammation which supervened was moderate, and the patient did well. These injuries must be treated according to the particular circumstances of the cases, and if inflammation arise, it should be treated actively; but the fact that they commonly do well should be remembered by the surgeon, that he may not too hastily despair of saving the gland in incised wounds even of a severe character. In these wounds the tubuli seminiferi sometimes project through the opening in the tunica albuginea, appearing between the lips of the outer wound like a slough or brownish flocculi. The surgeon should bear this in mind, for if he attempted to remove the projecting tubuli instead of repressing them within the scrotum, he would inevitably draw out more of the tubes and destroy part of the gland.

SECTION II.

SELF-CASTRATION.

Persons ignorant of surgery have been known, like the pious Origen,¹ to perform double castration on themselves, and have evinced considerable determination and indifference to pain in accomplishing their purpose. It is natural to suppose that no one would attempt such an act, by which the perpetrator deprives himself of a faculty whose possession is universally so highly prized, and whose loss so degrades the condition of man, except during a fit of temporary insanity. Yet I am strongly inclined to believe that self-castration is seldom undertaken without some strong motive intimately connected with the sexual functions, arising from a perverted use or guilty indulgence of them, and that some such cause may generally be ascertained by a little cautious inquiry. In some instances the attempt has been made by persons who have been unable to cure themselves of the odious vice of masturbation: such, I suspect, was the motive that led to the act in the two following cases which have come under my notice; in both, double castration was effectually completed. A lad, aged sixteen, was brought to the London Hospital in June, 1832, exhausted and faint with bleeding

¹ It is clear from the saying of Christ (St. Matthew 19: 12) that self-castration was practised, from a religious impulse, at a still earlier period than the time of the ancient Father, Origen.

going on from two wounds in the front of the scrotum; they were each about an inch in length, and situated at the sides of the raphe. Upon examination it was found that the scrotum did not contain the testicles. The boy subsequently gave the following account of his case. He stated that for about a week he had suffered from low spirits. Early in the morning he suddenly resolved to do himself some injury: his first determination was to cut his throat, but he afterwards resolved to perform the following act of mutilation. Having left his home in the Whitechapel Road for some fields in the neighborhood, he first passed a piece of string tightly around the root of the scrotum; he then made an incision to the extent of an inch on one side with a common penknife, and having squeezed the testicle through it, divided the cord and removed the gland; he then proceeded to excise the other testicle in the same way. The loss of blood was considerable, and he endeavored to restrain it by drawing the ligature tighter. He said he was not conscious of any pain in the operation; and though he could not assign any reason for selecting this mode of mutilation, he admitted that he had read in an encyclopædia an account of castration. The testicles were found in the field where the act was committed. The cord was divided close to the gland on one side, and at about an inch from it on the other. Ligatures were placed upon the spermatic arteries, and in three weeks the wounds had completely healed. No symptoms of insanity were evinced whilst the boy remained in the hospital: he enjoyed good health and spirits, and he talked and joked concerning his situation, without appearing at all to feel his loss. A man, aged twenty-two, was brought to the London Hospital in January, 1836, having cut out both his testicles. He had removed a small piece of the integuments, and squeezed the testicles out through the opening, and excised them, having previously tied a piece of string tightly round the spermatic cords to restrain the hemorrhage. These had retracted into the inguinal canals; and Mr. Adams, who was called to the case, was compelled to introduce his fingers at the wound and draw down the cords, in order to secure the vessels separately. The man admitted that he had been in the habit of constantly practising masturbation, and it was to rid himself of the perpetual desire to commit what he regarded as a great sin that he determined to remove the testicles. The wound healed without any unfavorable symptom.

I am indebted to Mr. Charles Hawkins for the following particulars of a case which occurred at St. George's Hospital. A man, about sixty years of age, much reduced in circumstances, and an inmate of a workhouse in the neighborhood of London, where he was employed as a schoolmaster, was about to be dismissed for having had connection with an idiot girl in the same house, when (as he said), to rid himself of the offending members which had been his ruin, he entirely removed with a razor both testicles and a considerable part of the scrotum. A medical man, who was called to him immediately after the ablation, secured the spermatic arteries, and then sent him to the hospital with his testicles in a paper parcel. Mr. Hawkins secured a small vessel which was still bleeding, and closed the wound in the scrotum with sutures. The part healed without a single bad symptom, and the patient left the hospital quite well in about five weeks, since which he had not been heard of.

Mr. Liston relates that a boy in Edinburgh, wishing, as he said, to lead a "holy life," applied to be castrated. Mr. Liston recommended him to wait some time before he had the operation performed, observing that as he was still growing the testicles might be reproduced. After another interview, in which castration was again put off on the plea of his age, he called one evening at Mr. Liston's house, having attempted the operation with a penknife. One of the testicles was completely exposed, and merely hanging by the cord; the boy said, "he did not like to cut the string." The wound was dressed, and the boy handed over to the priest to be admonished, but he did not apply again.¹

Mr. Reid, surgeon, Markinch, states that he was called to a lad, a shoemaker, aged seventeen, who had attempted self-castration with a sharp-pointed knife. The right testicle was found hanging from a clean wound in the scrotum about $1\frac{3}{4}$ inch in length. The tunica vaginalis was cut to the extent of half an inch, and the posterior part of the testicle was slightly lacerated. The testicle was returned into the scrotum, and the wound dressed; the part was completely healed in about three weeks. He said that his reason for committing the deed was, that for some time past he had had such frequent and copious seminal emissions, that his master had quarrelled with him about soiling his sheets; so as to do away with

¹ *Lancet*, vol. i, 1838-9, p. 38.

this cause of disagreement he had committed the rash act. The great bleeding had prevented him from completing the operation.¹

Dupuytren mentions the case of an old man married to a young and trifling woman, of whose conduct he thought he had good reason to complain, who resolved to destroy himself, and completely extirpated both his testicles. The cure was prompt, but the monomaniac shortly afterwards drowned himself.²

To these curious cases of self-castration may be added a remarkable one recently communicated to the Société Médico-Pratique de Paris (l'Union Médicale, t. ix, No. 129) by Dr. Le Lonjon, of Tours. In August, 1854, he was summoned to a man, aged thirty-two, in consequence of an alarming hemorrhage from a wound in the scrotum, which had been completely arrested, however, before his arrival, by another surgeon, by the application of a concentrated solution of the perchloride of iron. It appeared that the patient had been addicted to masturbation at college, and at the age of twenty-four became troubled with persistent and painful erections, followed by ejaculations, which were attended with excessive pain in the genital organs, especially in the left testicle. He tried various remedies without success; and having in vain urged his physician to remove the testicle, presumed to be diseased, a proceeding which the sufferer believed could alone put an end to his troubles, he conceived and executed, unknown to his family, self-castration, having ascertained from medical works the mode of proceeding and the after-treatment. The wound healed in three months. After a period of remission, the erections, and sufferings which seemed inseparable from them, returned with increasing intensity. The remaining testicle became excessively painful, appeared to the patient the true seat of the evil, and he determined to excise it. After a night passed as usual without sleep, he got up, took a pair of scissors, made an incision in the scrotum, dissected, layer by layer, the envelopes of the testicle, and at length reached the organ and the cord, which he exposed and isolated. A ligature was placed round the cord, but unfortunately in dividing the latter he also cut the ligature, and a violent hemorrhage ensued. Preserving his *sang froid*, he placed his finger over the wounded artery, went into the nearest water-closet, and threw away the tes-

¹ Edinb. Medical and Surgical Journal, July, 1837, p. 93.

² Leçons Orales, t. ii.

ticle, returned, and summoned assistance, continuing in spite of the compression to lose blood, but not his presence of mind and stoic courage. In about a month the wound had almost entirely healed, and the patient left Tours.

It thus appears that these cases of self-mutilation usually do well, and that the state of mind under which the injury is inflicted does not operate prejudicially to the patient's recovery.

CHAPTER IV.

HYDROCELE.

THE term *hydrocele* is applied to a chronic swelling produced by a collection of fluid in connection with the testicle or spermatic cord.

The following table exhibits its different forms, varieties, and complications.

Hydrocele	Of the Testicle	Vaginal	{ Simple.
		Encysted	{ Congenital.
	Of the Spermatic Cord	Diffused.	{ Of the Epididymis.
		Encysted.	
	Complications of	Vaginal H. combined with Encysted H. of the Testicle.	{ Of the Tunica Albuginea.
		Vaginal H. combined with Encysted H. of the Cord.	
		Vaginal H. combined with Diffused H. of the Cord.	{ Vaginal H. combined with Inguinal Hernia.
		Oscheo-Hydrocele . . .	
	Of the Hernial Sac	True.	{ Encysted H. of the Cord combined with Inguinal Hernia.
		Spurious.	

SECTION I.

SIMPLE VAGINAL HYDROCELE OF THE TESTICLE.

The sac of the tunica vaginalis, like other serous cavities, is liable to dropsical effusion. But before treating of this affection I must make a few observations on inflammation of the tunica vaginalis, or, as it is sometimes termed, *acute hydrocele*.

The inflammatory changes of the tunica vaginalis resemble those of the other serous membranes. Investing, however, an organ not essential to life, this membrane when acutely inflamed very rarely comes under the notice of the pathologist. In a testicle which I examined shortly after an attack of acute inflammation, I found fibrinous exudation on both surfaces of the tunica vaginalis present-

ing a honeycomb or lace-like appearance, similar to that often met with in the pericardium. On examining a testicle affected with acute consecutive orchitis supervening upon chronic, the opposed surfaces of the tunica vaginalis were connected throughout by loose fibrinous adhesions of a light reddish color, and infiltrated with serum of a faint red hue: small quantities of the serum were isolated in different parts in imperfectly formed cysts. The tunica vaginalis was thickly covered with bloodvessels, and in two or three places minute branches could be traced penetrating the false membranes. In inflammation of the tunica vaginalis the epididymis is generally more or less swollen. In the Museum of the College of Surgeons, there is a beautifully injected preparation of hydrocele, showing the effects of inflammation after the application of the caustic. It is represented in the annexed wood-cut, which exhibits the sac with part of it cut away to show the swollen state of the epididymis, and the aperture made by the



caustic (1); the tunica vaginalis is coated with flocculi of lymph. The sac of an inguinal hernia is seen above the hydrocele. The

sound state of the body of the testicle, though surrounded by an inflamed serous tunic, whilst the epididymis partakes in the disease, has been accounted for by Gendrin.¹ He says, when the subserous cellular tissue, which always participates in the inflammation of a serous membrane, penetrates into the interior of an organ, it becomes a ready means of communicating the inflammatory action; but when the contiguous organ or subjacent part is of a different structure from that of the cellular tissue, the extension of inflammation inwards is checked. Thus, in the case of the inflamed tunica vaginalis, the cellular tissue readily transmitted the morbid action to the epididymis, but the tunica albuginea arrested its progress to the body of the testicle; and this explains the fact that after inflammation of the tunica vaginalis, excited by injection, the body of the gland is rarely found to suffer. On the other hand, the epididymis is seldom attacked with inflammation without the disease being quickly propagated to the tunica vaginalis.²

The fibrin exuded in inflammation very often forms adhesions between the opposed serous surfaces, and these, after a time, become firm and dense, and in old cases are liable to be converted into a dense and firm fibrous tissue. The chief inconvenience of these adhesions arises from the testicle being more exposed to injury, in consequence of its not being able to glide away from pressure so readily as before. If inflammation of the tunica vaginalis be very violent, it may go on to the formation of pus. Suppuration, however, is a rare occurrence, unless artificially excited for the cure of hydrocele.

Inflammation of the tunica vaginalis is not only the most frequent

¹ *Journal Général de Médecine, &c.*, t. lviii, p. 25; quoted from Gendrin, *Histoire Anatomique des Inflammations*, t. i, p. 143.

² An able writer in a review of the first edition of this work, in the *British and Foreign Medical Review* (vol. xvii), in commenting on these views of Gendrin to which I have given my assent, calls attention to the remarks of Sir A. Cooper, who says, "In general I observe that when there are marks of inflammation upon the tunics of the testis—such as, for example, adhesion—the substance of the gland itself is changed, the septa are much more apparent than natural, the seminiferous tubes appear to be less in number, are unquestionably much reduced in size, and may become cords instead of tubes." (*Cooper on Diseases of the Testis*, p. 23.) My observations are quite at variance with this statement. I have so constantly found marks of inflammation in the tunica vaginalis coexisting with a perfectly sound condition of the body of the gland, that in opposition to the high authority of Sir A. Cooper, I must regard the presence of morbid changes in the testicle in such cases, as the exception rather than the rule. They occur when the tunica vaginalis has participated in inflammatory disease commencing in the substance of the testicle.

disease of the testicle, but it is also one of the most common affections to which the body is liable. In some of the disorders of the gland, especially orchitis, this membrane usually becomes inflamed, and adhesions between its opposed surfaces are scarcely less common than those of the pleura. In examining the testicles of twenty-four adults, I found fibrinous adhesions of greater or less extent in one or both glands in nine instances. In the testicles of fifty-nine old men, Dr. Duplay found adhesions seventeen times, seven on the right side, six on the left, and in four instances on both sides.¹ The symptoms produced by active inflammation of the tunica vaginalis, and the treatment proper for its removal, are sufficiently comprehended in the observations on acute secondary orchitis, of which disease it is a very frequent complication.

Common vaginal hydrocele is essentially a chronic affection. The fluid effused is usually transparent, and of an amber, pale yellow, citron, or straw color, and resembles the serum of the blood, but is occasionally thick and dark colored from the admixture of blood. According to Dr. Marcet's analysis,² 1000 grains of this fluid, of the specific gravity 1024·3, contained 80 grains of solid matter, of which 71·5 consisted of animal, and 8·5 of saline ingredients; hence it appears that this fluid only differs from the serum of the blood in possessing rather less animal matter. In an analysis of the fluid of hydrocele made by Dr. Bostock,³ 100·00 parts of the specific gravity 1024 were found to contain

Water,	.	.	.	.	.	.	.	.	.	91·25
Albumen,	.	.	.	.	.	.	.	.	.	6·85
Uncoagulable matter,	.	.	.	.	.	.	.	.	.	1·1
Salts,	.	.	.	.	.	.	.	.	.	·8
										<hr/>
										100·00

A quantity of flaky matter or flocculent albumen is sometimes found floating in the fluid; and it frequently contains, especially in old people, cholesterine in the form of a multitude of minute shining particles. The quantity of cholesterine contained in nineteen ounces of dark fluid full of these shining particles, which I removed from an old hydrocele, amounted to nine grains. In the examination of a testicle from a man of color who died at an advanced age, I found the tunica vaginalis and its investing tissues very thick and

¹ Archives Générales de Médecine, Août, 1855.

² Medico-Chirurg. Trans. vol. ii, p. 372.

³ Ibid. vol. iv, p. 72.

firm, and the seat of cartilaginous and osseous deposits; it contained about three drachms of a thick brownish substance, which was almost entirely composed of cholesterine. This was, no doubt, a very old case of hydrocele, in which, the more fluid parts having been absorbed, the cholesterine was left behind within the indurated sac.

The quantity of serum which accumulates varies considerably. In this country it seldom exceeds twenty ounces, though it has been known to amount to several pints. The largest quantity which I have met with is forty-eight ounces. Mr. Cline is said to have removed from Gibbon the historian, as much as six quarts.¹ From a table of 1000 cases of hydrocele which occurred at the native hospital of Calcutta, constructed by Dr. Dujat, it appears that the quantity of serum evacuated, varied from less than ten to upwards of one hundred ounces. Of 370 cases of double hydrocele, the fluid was more abundant on the right side in 109, and on the left side in 128. Of the 630 cases of single hydrocele, in rather more than a third of the number the quantity of fluid was under ten ounces; in two-sevenths it was from ten to nineteen ounces; in nearly a third from twenty to forty-nine; and in eighteen cases the quantity of serum was from 50 to 120 ounces.²

In simple hydrocele the testicle is found at the posterior part, and rather below the centre, of the sac. Its situation, however, is subject to variations. Before the occurrence of hydrocele, the tunica vaginalis may have been inflamed and contracted adhesions, so that the testicle may be connected to the membrane in front; in which case, the serum accumulates on each side of or above and below the organ. The position of the testicle in front may also be owing to an original inversion of the organ, in which the free surface presenting backwards, the fluid collects in that direction and presses the testicle to the front of the sac. It is stated that adhesions occur, producing a sacculated arrangement, and forming what is termed a *multilocular hydrocele*; and that occasionally the cysts thus formed have no communication with each other. In two instances I have seen a membranous partition in the sac of a hydrocele, separating it into two distinct cavities, formed by a layer of false membrane; but such a separation is extremely rare, and I believe

¹ Sir A. Cooper's Lectures, by Tyrrel, vol. ii, p. 92.

² Gazette Medicale de Paris, 1838, p. 562.

that what is called the multilocular hydrocele, is, in general, either a form of the encysted, or a complication of the vaginal and encysted. There is one kind of sac or pouch often met with in hydroceles, which is not commonly described. It is situated on the inner side of the testicle, but the opening into it is always found on the outer

Fig. 12.



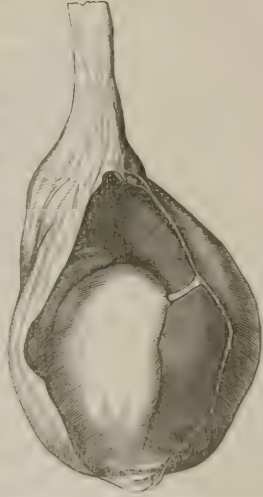
1. Aperture of the pouch between the body of the testicle and middle of the epididymis.

side, between the body of the gland and the middle of the epididymis. This sac, which varies very much in size, is formed by the distension of the cul-de-sac which I have described as existing naturally at this part. Two examples of this kind of pouch are contained in the Hunterian Museum. One of them is represented in the accompanying figure. In a case of congenital hernia, the sac of which contained a good deal of false membrane, I once found the opening between the body of the gland and epididymis, leading to a cul-de-sac which extended as far as an inch and a quarter up the cord. In large hydroceles, the epididymis is usually flattened, elongated, and displaced; and instead of a pouch being formed, the central part of the epididymis is drawn to some distance from the body of the testicle.

In old hydroceles the sac is often a good deal thickened, the tissues enveloping it being condensed and converted into layers of dense fascia, such as are commonly observed investing only hernial sacs. The fibres, also, of the cremaster muscle, become remarkably developed. This, however, is not constantly the case; for in some instances of hydrocele of large size I have found this muscle atrophied. The sac sometimes acquires the induration of cartilage, and after many years becomes apparently ossified. The thickening and induration are chiefly due to the exudation of fibrin on the parietal portion of the tunica vaginalis, and its conversion into a false membrane of dense fibrous tissue or fibro-cartilage, which, in old cases, contains calcareous concretions. These changes have been minutely described by M. Gosselin, who notices that the false membrane stops generally at the epididy-

mis, and is not continued over the testicle.¹ In several instances, however, I have traced it passing over the body of the gland, though in a thinner layer than the lining of the sac. In the Hunterian Museum there is a preparation, showing a long narrow band of adhesion passing from the anterior part of the testicle across the dilated sac of the tunica vaginalis to the membrane in front, which is supposed to have resulted from a wound of the testicle in the operation of tapping. In all large hydroceles the spermatic vessels are separated and displaced. The glandular structure of the testicle is sound, and the organ capable of exercising its functions. The disease is strictly confined to the investing serous tunic. The testicle is, however, frequently somewhat altered in shape, being flattened by the pressure of the confined fluid; and in some instances has been found partially atrophied.

Fig. 13.



Hydrocele is a very common disease in persons of all ranks in life, and in most climates, but more particularly in warm countries. Many writers have noticed its frequency both in the East and West Indies.

This disease occurs at all periods of life; but commences in early infancy, and at middle age, more frequently than at any other period. It is rather a common affection within a few weeks after birth. In sixty cases of hydrocele, M. Velpeau, of Paris, found,

Between the ages of 15 and 20,	.	.	.	.	.	.	3
" " 20 " 30,	.	.	.	.	.	.	13
" " 30 " 40,	.	.	.	.	.	.	11
" " 40 " 50,	.	.	.	.	.	.	16
" " 50 " 60,	.	.	.	.	.	.	10
" " 60 " 70,	.	.	.	.	.	.	6
" " 70 " 80,	.	.	.	.	.	.	1 ²

In a table of 1000 cases of hydrocele treated by iodine injection at the Native Hospital of Calcutta, it appears that none of the

¹ Archives Générales de Médecine, 4e série, t. xxvii.

² La Presse Médicale, Mai, 1837.

patients operated on were less than eighteen years of age; about one twenty-fourth were not more than twenty years old; rather more than a sixteenth were from twenty-one to twenty-five years of age; a little less than half from twenty-eight to thirty-five; a little more than a quarter from thirty-six to forty-five; and an eighteenth were upwards of forty-six years.¹

Hydrocele is generally single, but sometimes occurs on both sides. It is commonly said to form more frequently on the left side than on the right. For a few years I registered the new cases of hydrocele coming under my notice in public and private practice. Of one hundred and fifteen cases of simple hydrocele, one hundred and nine were single, and six double. Of the former, sixty-five occurred on the right side, and forty-four on the left. This result, which gives a decided predominance to the right side, does not agree with the observations of Velpeau, Gerdy, and Dujat, who found the disease to be more frequent on the left side. Hydrocele in young infants is usually single, and, in my experience, more common on the right side. I have seen, also, a few cases of double hydrocele at this early period.

Dropsy of the tunica vaginalis is usually regarded as purely a local affection, resulting from a disturbance of the nicely-adjusted balance between the functions of secretion and absorption. The same general causes which tend to produce effusion in the other serous membranes, we may conclude likewise operate in occasioning hydrocele. All circumstances which determine blood to the organ in excess, or impede its return to the heart, or which act in any way in disturbing the circulation through the gland, must be

¹ Table of 1000 cases of Hydrocele treated by Iodine Injections at the Native Hospital of Calcutta, from Jan. 1, 1836, to Jan. 5, 1838; constructed from the Registers by M. Dujat.

Ages.	Cases of Single Hydrocele.			Double.	Total.
	Right.	Left.	Total.		
From 18 to 20 years of age,	14	11	25	16	41
21 to 25 " "	51	53	109	64	173
26 to 35 " "	147	147	294	179	473
36 to 45 " "	72	94	167	90	257
46 to 59 " "	17	6	23	20	43
60 to 70 " "	4	8	12	1	13
	305	325	630	370	1000

regarded as remote causes of the disease; and, considering the exposed and depending situation of the testicle, the liability of its vessels to obstruction, and the irregular nature of its functions, there can be no difficulty in accounting for the frequency of this affection.

Hydrocele is occasionally developed after a violent strain or great fatigue, or after a slight blow on the gland which was considered at the time to be too trivial to require attention. In many of these cases the effusion appears to originate in a low degree of inflammation of the tunica vaginalis. I have already stated that marks of previous inflammation are occasionally observed in the sacs of hydroceles. On examining the body of a man, aged forty-nine, who died of apoplexy, I found about two ounces of serum in the vaginal sac of both testicles, and also several old adhesions, and some spots of induration and thickening of the testicular portion of the membrane. I have observed similar appearances in other cases of incipient hydrocele, as well as imperfect multilocular cavities and septa, and induration, and enlargement of the epididymis, clearly evincing that the part had been the seat of inflammation. In some few instances I have met with hydrocele under circumstances which have led me to suspect that the disease was connected with, or sympathetic of, a chronic affection of the urethra, as stricture and morbid irritation in the canal. Hydrocele occasionally results from the irritation produced by loose accidental bodies in the tunica vaginalis, which are more frequently present than is generally supposed. In disturbed states of the circulation from disease of the heart, the tunica vaginalis is not so frequently the seat of dropsical effusion as the other serous membranes, with the exception of the arachnoid; but this is partly owing to the pressure exerted around the testicle by the accumulation of fluid in the scrotum, and the relief to the spermatic vessels afforded by the œdema. In cases, however, of general anasarca, I have very frequently found slight effusion into the vaginal sac combined with œdema of the scrotum.

When the fluid collected in the tunica vaginalis is attended with enlargement of the testicle, the swelling is termed a *hydro-sarcœcele*. This affection is generally consequent on chronic orchitis, but it is occasioned by other morbid changes, malignant as well as innocent. In these cases the disease of the testicle is the original complaint

and source of the irritation that excites an undue secretion from the tunica vaginalis.

Symptoms.—Simple hydrocele forms a swelling which is elastic and of an oval or pyriform shape, which fluctuates, and has a smooth and even surface, and which, commencing at the lower part of the scrotum, increases very gradually and without causing pain. At its back part the tumor feels firm and solid, and strong pressure there occasions the peculiar sensation experienced from compression of the testicle. The swelling is movable, but remains constant under pressure, and in all positions of the body; and unless of large size, the spermatic cord can be felt above it. When examined by transmitted light, the tumor is found to be more or less transparent, except at the part where the testicle is situated, the opacity there indicating the exact position of the gland. When the hydrocele is of considerable size, the integuments are tense, and the veins ramifying beneath the skin appear prominent and enlarged. The penis is also partly or entirely buried in the swelling, the skin which usually invests it being drawn forward into the scrotum, giving to the orifice of the prepuce somewhat the form of the umbilicus. The hydrocele, even when large, is seldom attended with pain; though its bulk and weight produce a good deal of inconvenience, and, if not supported, the tumor produces a dragging effect on the spermatic cord, which causes uneasiness in the loins. Its progress varies in different individuals, the hydrocele in some instances being several months in attaining a size which in other cases it reaches in as many weeks. But its course is, in general, slow; and twelve and even eighteen months may elapse before the swelling approaches the abdominal ring. Sometimes after arriving at a certain magnitude it ceases to increase; whilst in other cases its growth, though slow, is uninterrupted. It rarely happens that a hydrocele attains any considerable magnitude, because so much inconvenience is occasioned by the tumor when of large size that the patient obtains relief at an early period; otherwise it might increase until it reached as low down as the knees, as has really happened in long-neglected cases. Mursinna mentions a case¹ in which the tumor measured as much as twenty-seven inches in length, and seventeen in width, which is, I believe, the largest hydrocele on record.

¹ Neue Medicinische-Chirurgische.

The symptoms of hydrocele are liable to several modifications. It sometimes happens, especially in children, that the tunica vaginalis remains after birth unobliterated for some distance along the cord; consequently, when fluid collects, the swelling assumes a pyramidal and elongated form, and the relative situation of the testicle is lower than in ordinary cases. Under these circumstances, there is often a well-marked contraction in the centre of the hydrocele, giving to the tumor the form of an hour-glass. The contraction is found just above the testicle, corresponding to the point where the obliteration of the prolongation of peritoneum usually takes place. A somewhat similar contraction is sometimes produced by bands of adhesions between the surfaces of the tunica vaginalis. In consequence of the sac and its investing tissues yielding unequally to the pressure of the fluid, the surface of the tumor, instead of being smooth and even, may be more or less irregular and unequal. In inversion of the testicle (vide p. 87) the relation of parts is reversed, and the gland, instead of being at the back of the sac, is seated directly in front. When the sac is loose and not fully distended, the testicle may be readily felt wherever situated. This is often the case in children. Fluctuation is sometimes obscure, and in other instances is not distinguishable at all, owing to extreme tension or great thickness of the sac.

Mr. Pott remarks, "The transparency of the tumor is the most fallible and uncertain sign belonging to it: it is a circumstance which does not depend upon the quantity, color, or consistence of the fluid constituting the disease, so much as on the uncertain thickness or thinness of the containing bag, and of the common membranes of the scrotum. If they are thin, the fluid limpid, and the accumulation made so quick as not to give the tunica vaginalis time to thicken much, the rays of light may sometimes be seen to pass through the tumor; but this is accidental, and by no means to be depended upon. Whoever would be acquainted with this disorder must learn to distinguish it by other, and those more certain, marks, or he will be apt to fall into very disgraceful as well as pernicious blunders."¹ The value of transparency, as a sign of hydrocele, is underrated in these remarks. In ordinary cases the surgeon should certainly be able to detect the disease without its assistance; and this is the more necessary, as its absence is no proof that the tumor is not a

¹ Works, 4to. p. 394.

hydrocele. But it would be absurd to reject the aid of a symptom which, when present, constitutes one of the most certain signs of the disease, because of its inconstancy; and, in the present day, there are few surgeons even of experience who do not avail themselves, in cases of doubt, of this ready and simple mode of examination. But, independently of the advantage to be derived from transparency as a means of diagnosis, we are enabled by this mode of examination to ascertain the exact position of the testicle, which is always important before undertaking any operation. In cases of encysted hydrocele, or inversion of the testicle, the unusual situation of the gland may thus be detected, and risk of injury to it be avoided. The mode of making the examination is to darken the room, and place a lighted candle so that the tumor, when thrust forwards by the hand grasping it behind, may be interposed between the eye and the light, whilst the edge of the other hand is at the same time closely applied to the front of the hydrocele in order to intercept the light from the candle. The testicle is then recognized as an opaque object, and its situation exactly ascertained. In cases in which the walls of the sac are unusually thick, or when the fluid is dark in color, I have derived assistance from using a common stethoscope. One end being placed against the tumor opposite the light, the surgeon on looking through the bore of the instrument can observe the transparency with great advantage. The growth of a hydrocele is occasionally attended with a good deal of local uneasiness, which has been ascribed to pressure on a nerve, or to the presence of accidental cartilages in the cyst. I have generally found, when pain exists, that the dropsical collection has either originated in, and been kept up by some disease of the testicle, or has formed quickly and produced great tension of the sac, the tunica vaginalis being too forcibly dilated to accommodate itself gradually to the effusion. A hydrocele sometimes varies in size, being larger and more tense in the after part of the day than when the patient first rises in the morning. I have not exactly observed this change; but it has been so often mentioned to me by persons affected with hydrocele, that I entertain no doubt of the fact; and since the extent of surface afforded by the dilated tunica vaginalis is large, and the condition of the parts during day and night very different, such variations in size consequent upon alterations in the functions of secretion and absorption do not appear at all unlikely to occur.

I have been informed of a case in which the change was so remarkable, that the scrotum, which was full and tense when the patient retired to rest, became contracted and corrugated by the time he rose in the morning.

Diagnosis.—A hydrocele is usually distinguished without difficulty. The surgeon may conclude that a scrotal swelling is a hydrocele, if the tumor be tense, transparent, and fluctuating; if it has a smooth and uniform surface; and if the testicle cannot be felt, and its position can only be ascertained by the greater solidity of the swelling, and the uneasiness experienced on pressure at one particular part, which is generally behind; and if the spermatic cord can be distinctly felt of its natural size, and in a healthy state. The affections most likely to be confounded with hydrocele are scrotal hernia and malignant disease of the testicle. A hydrocele differs from a scrotal hernia in the following circumstances:—The swelling commences at the lower part of the scrotum; whereas in hernia it begins at the ring, and gradually descends. The spermatic cord can be clearly felt above the tumor; but in hernia it can only be traced indistinctly along the back part of the swelling, and sometimes cannot be distinguished at all. The testicle cannot be felt; but in hernia, unless congenital, the gland can be readily perceived at the bottom of the swelling: and, further, there is no impulse communicated on coughing, and the tumor is not subject to variations in size, as in rupture. The diagnosis is made with less facility when the hydrocele extends upwards along the cord nearly to or even into the ring, as in this case the cord cannot be felt; and the shape of the tumor nearly resembles that of a scrotal hernia, and there may even be a slight impulse transmitted to it on coughing; but attention to the other distinguishing marks which have been pointed out will always be sufficient to enable the surgeon to make an accurate diagnosis. I have never experienced greater difficulty in the diagnosis of this affection, than in a case of large hydrocele extending upwards as high as the internal ring, and receiving consequently an impulse on coughing as distinct as is commonly felt in scrotal hernia. The difficulty was further increased by the thickened state of the sac and dark color of the fluid so obscuring the transparency of the tumor, that a strong light could be only faintly perceived on careful examination through a tube in a darkened room. In this case I took the precaution of

cutting down to the sac with a scalpel instead of puncturing it with a trocar.

To distinguish simple hydrocele from malignant disease of the testicle is not difficult, unless the parietes of the sac containing fluid be much thickened. But when the cyst is so thick and dense as to render fluctuation obscure, and not to admit the passage of rays of light, a careful examination is necessary to enable the surgeon to form a correct opinion. Like hydrocele, the diseased testicle may present a tumor of an oval form, which has commenced at the lower part of the scrotum, and has formed gradually and without causing pain. It may also fluctuate indistinctly, and remain of uniform size under pressure, and in all positions; and the spermatic cord may be felt above it in its natural state. In lightly balancing, however, the tumor in the hand, the diseased testicle feels heavier than a hydrocele; and its external surface is seldom so even and uniform as, nor does it often assume the pyramidal form of, a hydrocele. On pressing the part occupied by the testicle, if the tumor be a hydrocele the usual pain is experienced; whereas if it be a malignant swelling of a large size, the disorganization is attended with loss of the natural sensibility of the gland. If the slightest transparency can be detected on inspecting the swelling through a tube in the manner explained (and I have met with very few cases of hydrocele in which transparency could not be perceived when the tumor was examined in this way), all doubt becomes removed. But in an obscure case the surgeon might introduce a grooved needle or fine trocar into the swelling, when, if the case be hydrocele, the escape of fluid would at once manifest the nature of the disease. I once met with an indolent tumor of small size in the scrotum of an old man, which was so irregular and uneven, felt so solid, and weighed so heavy, that it was impossible to determine exactly whether the swelling was occasioned by a morbid enlargement of the gland, a hæmatocele, or a hydrocele with the sac unusually thickened and indurated. The age of the patient was such as to put an operation out of the question. He subsequently died of disease of the chest; and, on examination, I found the tumor to be a hydrocele, the sac of which was lined by a thick and extremely dense false membrane, and contained a soft oleaginous substance, consisting chiefly of cholesterine. The nature of such a swelling could only have been clearly ascertained by a punc-

ture. The difficulty of the diagnosis, in cases of cartilaginous thickening of the tunica vaginalis, has been attested by Dupuytren. In a case of enlargement and induration of the left testicle, attended with lancinating pains in the groin and loins, and much emaciation, symptoms expressive of scirrhus disease, and unaccompanied with any sign indicative of hydrocele, or scrofulous or venereal disease, this distinguished surgeon, to avoid all chance of error, made an exploratory puncture. The result showed the prudence of this precaution; for, instead of scirrhus, the case was found to be a hydrocele, with cartilaginous thickening of the tunica vaginalis.¹

Treatment.—Though hydrocele is a disease free from danger, it causes serious inconvenience and discomfort. When of large size, its weight is such that it has a dragging effect on the spermatic cord, and produces considerable uneasiness. This may indeed be obviated in a great measure by supporting the tumor in a suspender; and, as a general rule, the patient should always be directed to wear one. There are, however, other sources of annoyance. The tumor is constantly exposed to slight blows, and impedes the activity of the patient's movements. In warm weather troublesome excoriations are often caused by the friction of the hydrocele against the inner part of the thigh. The penis being partly buried in the swelling, micturition and the genital functions are more or less interfered with; and as the tumor cannot be fully concealed by the dress, even motives of delicacy strongly incline the patient to desire its removal; so that persons laboring under this complaint generally apply sooner or later to the surgeon for relief.

A hydrocele may disappear without any treatment whatever. In infants this is a constant occurrence, but in adults is extremely rare. Mr. Pott has recorded two instances in the adult of confirmed hydrocele, which subsided without treatment. One is the case of a gentleman, forty-five years of age, in which the dropsical collection dispersed during six weeks' confinement for a severe fit of gout. The other is the case of a middle-aged man, who whilst intoxicated fell down and struck his scrotum against a piece of scaffolding, which caused considerable ecchymosis. This disappeared in about a fortnight, when it was observed that the hydrocele was much less in size than it was before the accident. In about three weeks more the whole of it had subsided, and it did not afterwards return.² The

¹ Leçons Orales, tom. i, p. 49, edit. Brux.

² Lib. cit. pp. 413, 414.

sac was most probably ruptured, and the cure effected by inflammation of the membrane excited by the injury. Sir B. Brodie also mentions that he has met with two examples of the spontaneous cure of hydrocele. In one of them the removal of the disease also appeared to have resulted from inflammation set up in the sac.¹ A hydrocele has even been known to disappear permanently after an attack of orchitis, consequent upon the extension of inflammation from the urethra. But these cases are exceptions to the general rule, and are not to be taken into account in determining upon the treatment to be adopted.

Infants affected with hydrocele are frequently brought to the surgeon within the first or second month after birth, the tumor naturally enough exciting uneasiness in the mind of the mother. In these cases, all that is necessary in the way of treatment is a stimulating application, and support to the scrotum with a bandage. A lotion, composed of an ounce of the hydro-chlorate of ammonia, four ounces of distilled vinegar, and six ounces of water, or painting the scrotum with tincture of iodine, will generally cause the removal of the fluid. The application of collodion is equally effectual. If the hydrocele does not disperse under this treatment in the course of two or three weeks, the tumor may be pricked with a cataract needle in two or three places, which will allow the escape of the fluid into the connective tissue of the scrotum, from whence it will be rapidly absorbed. If the swelling return, before it attains its former size, puncture can be again resorted to. This is the only operation that I ever found necessary in treating hydrocele in infants; and even acupuncture, which is a mild proceeding, and devoid of danger, is seldom required.

The cure of hydrocele has been attempted in the adult with external remedies. For this purpose highly stimulating lotions and liniments, frictions with iodine, tartar emetic, and mercurial ointments, and the repeated application of blisters to the scrotum, have been employed. Dupuytren once succeeded in removing a hydrocele by blisters; but Sir A. Cooper tried repeated blistering without producing a cure. I have applied blisters and the *linimentum hydrargyri* in several instances, and have also been unsuccessful.²

¹ Lond. Med. Gazette, vol. xiii, p. 90.

² Blistering the scrotum in persons advanced in life is not free from risk. M. Gerdy relates a case in which gangrene of the scrotum occurred after the application of a

In the following case I succeeded in temporarily removing a hydrocele by external treatment. A corpulent gentleman, fifty-one years of age, consulted me on account of a hydrocele of the right testicle, which he had observed for about six months. The fluid within the sac did not appear to amount to more than three ounces, and it produced no inconvenience. I painted the scrotum with a strong solution of iodine, and directed the use of a suspender. This application was made twice, and in three weeks all the fluid had become absorbed. In a few weeks afterwards the fluid again began to collect, and the hydrocele was subsequently cured by injection.

I have employed local treatment in other cases of older standing, but without success. External applications have, indeed, so seldom proved of any avail, that after the age of puberty chronic hydrocele is considered incurable by such remedies; and the time lost in the experiment, and the pain and annoyance they produce, are serious objections to any trial of them.

The distended tunica vaginalis is liable to be ruptured by accidental violence, the fluid escaping into the surrounding connective tissue, and producing œdema of the scrotum, instead of the defined tumor which previously existed. The œdema usually extends to the penis, and sometimes reaches the lower part of the abdomen, occasioning a diffused swelling, which might prove alarming to the inexperienced surgeon. The fluid, however, is not of an irritating quality, and is so rapidly absorbed that the accident is seldom attended with inconvenience. In these cases the hydrocele is removed for a time, and in many instances permanently; but in general the fluid collects again. In a French periodical a case is mentioned by M. Serres of a Spaniard about forty years of age affected with hydrocele, who was in the habit, when the tumor got sufficiently large to be troublesome, of mounting a horse, or taking some other violent exercise, until the swelling gave way. He stated that he had done this more than thirty times.¹

When a patient with hydrocele applies to a surgeon it is usual to resort at once to operative treatment, which is of two kinds—*palliative* and *radical*.

blister for the removal of hydrocele in a man sixty years of age. Archives Générales de Médecine, 111 sér. tom. i, p. 70.

¹ Lancette Française.

PALLIATIVE TREATMENT OF HYDROCELE BY OPERATION.

The palliative operation is exceedingly simple, of easy performance, and, if proper care be taken, free from danger; but the relief it affords is only temporary. It consists in puncturing the tumor so as to allow of the escape of the fluid contained in the tunica vaginalis: the operation may be performed with a lancet or a trocar. The best place for making the puncture is a little below the centre of the anterior part of the tumor; but the surgeon should first ascertain the situation of the testicle, for when the position of the gland is altered by adhesions or other causes, it may be necessary to puncture the tumor at the side, or even behind. It is better, however, to avoid the posterior part if possible, as in this situation there is some risk of wounding the spermatic artery. Simple as the case may appear, the surgeon should omit none of the customary precautions, for more mishaps have occurred in the puncture of hydroceles than in any other operation in surgery.

The lancet was formerly used for this operation, but is not now employed; for the whole of the fluid cannot well be evacuated through the opening thus made, without much squeezing and handling of the parts; and there is also risk of the division of some small vessel, which by pouring blood into the tunica vaginalis may produce a hæmatocele. The operation is usually performed with a trocar, the canula of which is about two inches long and a line in diameter. In selecting an instrument the surgeon should see that the canula fits properly, and that its shoulder does not project too much; or else, after the point of the trocar has penetrated the cyst, the canula may hitch outside it, and instead of entering the cavity push the tunica vaginalis before it. In such a case, if the accident be not perceived in time, the testicle or the back part of the cyst is very liable to be wounded. The trocar before being used should be thrust through a piece of wash-leather held tense, and unless it penetrates readily the instrument is unfit for use. This advice may seem unimportant; but it should be recollected that, in addition to the risk of converting the case into a hæmatocele, any bungling in an operation of so simple a nature as the tapping of a hydrocele may induce the patient to suspect a general want of skill.

I generally prefer performing this operation with the patient

standing before me; but if he be timid, or liable to faint, he may be seated in a chair, or placed in the recumbent position. The surgeon, grasping the tumor behind with his left hand so as to put the integuments upon the stretch, and taking care not to wound any of the enlarged veins beneath the skin, should insert the trocar, previously well oiled, in an oblique direction upwards with a brisk motion of the right hand; and as soon as the sac is perforated, which is ascertained by the immediate cessation of all resistance, the trocar should be withdrawn, whilst the canula is simultaneously thrust forwards by the action of the thumb and fore-finger: gentle pressure is then to be maintained until all the fluid is removed. By manipulating in this way all risk of the tunica vaginalis slipping off the tube, or of the testicle and back of the sac being injured, is prevented. After the whole of the fluid has escaped the canula is withdrawn, and the edges of the wound slightly nipped together; after which the only application necessary is a piece of adhesive plaster to the wound. The part should be suspended and the patient

Fig. 14.



should be directed not to walk about much for the next twenty-four hours, and to abstain from active exercise for a day or two; a precaution which is more especially necessary in individuals of an irritable or unhealthy constitution, or in advanced life. If this advice be neglected, acute inflammation of the tunica vaginalis is liable to succeed the operation. Some years ago I tapped the hydrocele of a healthy man, fifty years of age, who, notwithstanding the caution I had given him, walked several miles the same afternoon; the consequence was severe inflammation of the sac, followed by sloughing of the scrotum. After much suffering he recovered at the expiration of eight weeks, with the disease permanently cured. At a later period of life, if proper precautions be not taken, the palliative operation can scarcely be viewed as free

from danger. Sir A. Cooper mentions two cases of persons in advanced age, who having taken a long walk after the operation, had inflammation and sloughing of the scrotum, which terminated fatally.¹ Mr. Hamilton, of Dublin, also mentioned to me a case of gangrene of the scrotum ending fatally, which occurred in a person of unhealthy constitution from simple tapping.

The wound made by the trocar heals by the first intention. Friction of the scrotum against the dress sometimes causes slight inflammation, and even ulceration afterwards, so as to require the attention of the surgeon; but this is seldom the case, and when it occurs is easily remedied by the ordinary means. Occasionally there is slight extravasation in the connective tissue of the scrotum from a wound of some small vessel external to the sac, but very rarely to any extent so as to interfere with the healing of the wound.

The operation is always admissible whenever the amount of fluid is sufficient to admit of the introduction of the trocar without risk of injury to the testicle. It should be repeated as soon after the fluid has collected again as the tumor from its size or weight becomes troublesome. This varies greatly. I have had patients who for many years have been satisfied with the relief afforded by an annual operation; and in one case the fluid did not collect in a sufficient quantity to need removal for four years, when I drew off no more than sixteen ounces. In other instances patients have returned to have the fluid evacuated again at the expiration of two or three months, and even of a much shorter period. Indeed, I have known the hydrocele to regain its former size in the course of two or three days. Many persons complain of uneasiness from only a small quantity of fluid, whilst others experience but little inconvenience until the hydrocele has attained a large size. In most cases the patient's feelings will be the best guide in indicating the necessity for a repetition of the operation.

Many persons affected with hydrocele, which after being tapped appears very slowly, and without causing uneasiness, are so satisfied with the temporary benefit afforded by this slight and almost painless operation, that they desire no further relief than is derivable from its repeated performance; and as hydrocele is not a disease which if suffered to remain is commonly followed by important con-

¹ Lib. cit. p. 181.

sequences, such persons may be safely left to consult their own inclinations. Some patients are too timid to submit to any other kind of treatment, and others are unwilling to undergo for the permanent relief of so slight an inconvenience even the short confinement which might be required. Persons out of health, of an irritable constitution, or in advanced life, upon whom the radical operation cannot be performed without risk, must likewise be content with palliative treatment.

The tunica vaginalis may be emptied by a puncture made with a needle; when the fluid, instead of escaping externally, as in the former operation, gradually infiltrates the connective tissue surrounding the sac, whence it is afterwards removed by absorption. In this operation, which is termed *acupuncture*, anasarca of the scrotum is substituted for a common hydrocele. It was first suggested by Dr. Cumin, of Glasgow, who, at the conclusion of some observations on the treatment of ganglion by a similar procedure published in 1825, remarks, that it has occurred to him that a cure of hydrocele might be accomplished by opening a communication, by means of the cataract needle, between the cavity of the tunica vaginalis and the cellular tissue of the scrotum.¹ He did not, however, submit this idea to the test of experiment. Several surgeons have subsequently claimed the merit of originating this operation as a palliative cure for hydrocele. Mr. Lewis, surgeon, of London, is entitled to the credit of having first recommended acupuncture to his professional brethren on the grounds of practical experience of its efficacy;² though no doubt can be entertained that the plan had been previously resorted to by other surgeons, who had regarded it as either too simple or too unimportant to deserve a formal notice, or who perhaps did not sufficiently appreciate its value.³ Mr. Lewis punctured the tumor with a fine needle until a drop of fluid oozed out on withdrawing it, and in a few days the hydrocele entirely disappeared. The absence of danger, the slow reaccumulation of fluid, and the simplicity of the operation, are the advantages which he considers to be obtained by this mode over the operation of removing the fluid at once. In performing acupuncture I employ the common cataract needle, which I usu-

¹ Edinb. Medical and Surgical Journal, vol. xxiv, p. 97.

² Lancet, vol. ii, 1835-36, p. 206.

³ Vide note from Mr. Keate on the Treatment of Hydrocele, Medical Gazette, vol. xix. p. 789.

ally introduce in two or three different places, rotating the instrument between the finger and thumb to render the openings in the sac sufficiently patent. A little serum generally oozes out from the puncture in the skin in drops, or issues in a stream for a few seconds, and then ceases. In the course of a few hours the scrotal swelling becomes a good deal changed, and instead of a tense, smooth, and defined tumor, presents an œdematous tumefaction, with a soft, doughy, and inelastic feel. In large hydroceles the œdema extends to the integuments of the penis. The swelling thus produced takes from three days to a week gradually to disappear, the scrotum in favorable cases being left in its natural condition, without any excess of fluid either in its loose connective tissue or in the sac of the tunica vaginalis. The operation may be repeated again and again as the fluid returns, on each occasion before the tumor has acquired the same size as on the preceding one, by which means the sac may sometimes be gradually reduced to its natural size.

Though the advocates of this operation have not claimed for it the merit of constantly affording radical relief, it has been observed that the reaccumulation follows less quickly than after the fluid has been evacuated at once by the trocar, and in many instances does not take place at all. This accords to a certain extent with my own experience, for in several cases in which I have performed it, there was no return of the hydrocele for a period of many months.

Acupuncture cannot, however, be relied on for the permanent cure of hydrocele, but it must be regarded as a useful addition to our remedial means. It does not supersede the use of the trocar; for the latter is scarcely more painful or less simple, and in careful hands is equally safe and free from hazard, whilst the immediate and certain relief which the trocar affords will always give it an advantage. Acupuncture, too, is ill adapted for cases of thickened sac. In very timid persons, in those of impaired constitutions, and in children, and in some other forms of hydrocele not yet described, acupuncture may be resorted to with benefit, and even preferred to the trocar. I am informed by Mr. Luke, that in the case of a gentleman who was about to proceed to a place in South America, where there would be no surgeon nearer his residence than 400 or 500 miles, he instructed his patient to perform this simple and harmless operation on himself.

RADICAL TREATMENT OF HYDROCELE BY OPERATION.

The permanent and radical cure of hydrocele may be effected by any of the following operations:—Incision of the sac; excision or removal of the tunica vaginalis; caustic applied to the integuments; a tent introduced into the tunica vaginalis; a seton passed through the sac; and injection of the sac with a stimulating fluid;—all which plans appear to have been known to ancient practitioners.¹

Incision.—The treatment by incision is the most ancient of all these methods. In performing it the surgeon cuts gradually down to the cyst with a scalpel, and, making an opening into the upper part, introduces a director or the finger, and with a bistoury lays open the cyst as far as the bottom of the sac, so as completely to expose the testicle. Inflammation soon arises, and the tunica vaginalis becomes obliterated by adhesion; or else suppuration ensues, and the part heals by granulation. After the incision was completed, it was often the custom to stuff the tunica vaginalis with lint, or to apply some other coarse and irritating substance. This operation was consequently always succeeded by acute inflammation of the sac, the constitutional effects of which frequently proved exceedingly severe. Many of the older surgeons, as Wiseman, Cheselden, Heister, and Sharp, have noticed the painful and even dangerous consequences which sometimes resulted; and it is observed by Pott, that this “method can never be said to be totally and absolutely void of some danger.”² Mr. B. Bell, of Edinburgh, is the most recent authority in this country who has advocated this method of treating hydrocele, which he slightly improved upon by devising a less irritating mode of dressing.³

My brother, Mr. H. Curling, of Ramsgate, when in Paris witnessed several cases of hydrocele cured by incision by Jobert; but the treatment proved very severe, and confined the patients to bed for a long time. I have myself seen three cases of this disease

¹ Those interested in the history of the methods of cure for hydrocele may consult the writings of Sabatier (*Médecine Opératoire*), and the Treatise on Hydrocele by Sir James Earle. There are few diseases of the same importance which have been so much written on as this affection. Besides being largely treated of in most works on surgery, hydrocele and the particular modes of curing it has formed the subject of distinct treatises by the following British writers:—Douglas, Else, Pott, Howard, B. Bell, Keate, Earle, Holbrook, and Dease. Some of these works have run through several editions.

² *Lib. cit.* p. 441.

³ Treatise on Hydrocele.

attended with considerable thickening of the sac, which, after injections had failed, were successfully treated by incision; and certainly the consequences were less severe than the representations of Sharp and Pott would lead us to expect; but in these cases the tunica vaginalis was evidently less disposed to inflammation than usual. Incision is an operation rarely resorted to in the present day; and I quite concur in the general opinion, that the disease can be successfully treated by milder and safer means. When, however, in consequence of difficulty in the diagnosis, or of suspicion of hernia or disease of the testicle, an exploratory operation is required; or when a hydrocele is attended with great thickening of the sac, or is found to depend on the presence of loose cartilages, an incision may then be made with advantage.

Excision consists in cutting down upon the tunica vaginalis and excising the greater part of it with a pair of scissors, the spermatic vessels and testicle being left untouched. The wound, which is filled with lint and dressed, subsequently suppurates and heals by granulation. This operation is also one of considerable antiquity; but it long remained in disuse, until it was revived in England in the year 1755 by Mr. Douglas, who advised the removal of an oval portion of the scrotum, together with the cyst.¹ About the same period Bertrandi and several surgeons of eminence in France adopted the operation. The consequences of excision were not less severe or dangerous than those of incision; it was sometimes followed by gangrene of the scrotum, and generally by much constitutional irritation and tedious suppuration. This operation is now nearly exploded. I have only once seen it practised, and that was in the case of a young man, in which the tunica vaginalis was remarkably thickened, after the operation of injection had failed. The symptomatic fever which followed was mild, and the operation successful, the wound having healed completely in three weeks.

Mr. Kinder Wood, a provincial surgeon, has practised a modification of the operation of excision,² which is deserving of notice. He opened the tumor with a broad-shouldered lancet in the customary situation, the lancet in consequence of its figure making a larger incision into the external covering than into the tunica vagi-

¹ Treatise on Hydrocele, p. 136.

² Observations on the Cure of Hydrocele without procuring an Obliteration of the Sac, Medico-Chirurgical Trans. vol. ix. p. 38.

nalis. After the evacuation of the water through the opening, a small portion of the tunica vaginalis which presented at the internal opening was slightly hooked with a small dissecting hook, and a portion so brought forward through the incision was cut off with a pair of fine scissors. The puncture was then closed, and supported with adhesive plaster. In three cases in which this operation was performed the wound afterwards healed by the first intention. In two of them there was no return of the hydrocele when the part was examined several years after the operation; and in the third he remarks, "A sufficient time has elapsed to decide upon its certainty." In these three cases the cure was completed without an abolition of the cavity. They were instances of a perfect cure of the disease, and not of one effected by the obliteration of a natural membranous sac. In a fourth case in which this operation was tried, it was succeeded by severe inflammation of the testicle; the patient, however, was an unfavorable subject. It is not recommended in cases in which the sac is much thickened and indurated.

This operation, being neither severe nor dangerous, must be viewed quite in a different light from the old method of excision. Mr. Wood's report, although his experience at the time it was published was very limited, is upon the whole favorable; but the advantages which he claims for this mode are not such as appear to me to entitle it to any preference over injection. Dr. Titley states that he tried it on six patients in the West Indies; and although in some of them a very considerable portion of the tunica vaginalis was removed, yet it proved in every case unsuccessful.¹ We must conclude, therefore, that the mild form of inflammation which Mr. Wood considers fit to supersede the morbid state of the vessels, the cause of the effusion, cannot be insured by his plan with that degree of security and certainty which alone would recommend its adoption in practice.

Caustic.—In this method of treating hydrocele a caustic is applied to the scrotum, so as to destroy the integuments, and cause a slough extending to the tunica vaginalis. When the slough separates, the cavity of the tunica vaginalis becomes exposed, and the fluid within it escapes. This is followed by inflammation of the membrane, which afterwards contracts and closes by adhesion or

¹ Observations on the Cure of Hydrocele without procuring an Obliteration of the Sac, Medico-Chirurgical Trans. vol. ix, p. 38.

granulation. The effects of the caustic are represented in Fig. 11 (p. 106). In the preparation there is a small aperture in the tunica vaginalis about a quarter of an inch in diameter, produced by a slough, and the inflamed membrane is coated with delicate flocculi of lymph. The caustic, although a mode of treatment introduced at a later date than incision and excision, was practised by surgeons at a very early period. It has been particularly described and advocated by Mr. Else; and Mr. Cline, one of the best practical surgeons of his day, also appears to have formed a very favorable opinion of this remedy, which he considered the mildest mode of all others.¹

The caustic is in some respects a better method of treatment than those previously in vogue, the inflammation which it excites being less active and dangerous; but for many reasons it is an objectionable remedy. It occasions a needless destruction of parts, and is liable to produce a tedious and unhealthy sore: its action cannot be regulated with such exactness as to insure an opening through the tunica vaginalis; so that a fresh application of the caustic, or the introduction of a lancet or trocar, was often necessary to complete the process: its operation is slow, and the consequences are unnecessarily severe and painful. The treatment by caustic has therefore been long superseded in this country by milder means.

Tent.—This method consists in keeping a wound made in the tunica vaginalis by a small incision patent by introducing a tent of linen, lint, or sponge, or some more solid substance, as a canula, or a piece of elastic gum catheter, so as to induce inflammation. In some instances, when the tent was not of an irritating nature and was soon removed, the inflammation excited terminated in the effusion of lymph and the adhesion of the sides of the membrane. In other cases the result was less favorable, the inflammation ending in suppuration, and the obliteration of the cyst by granulation. The introduction of a tent into the tunica vaginalis is a very certain and effective mode of curing hydrocele, and at one period it was very commonly resorted to by practitioners. One of the most recent authorities by whom it is recommended is the late Baron Larrey, the distinguished French military surgeon. His plan was,

¹ Lectures on Surgery, from Notes by Dr. Wilkinson, Medical Gazette, vol. xxiii, p. 279. It must be observed that Mr. Cline's favorable opinion of the caustic was expressed previous to the appearance of Sir J. Earle's work on the radical cure by injection.

after drawing off the fluid by means of a trocar, to pass a piece of gum-elastic catheter through the canula into the interior of the tunica vaginalis, and to leave it there until sufficient inflammation to procure adhesion was excited. He speaks of this proceeding as being as mild as it is certain.¹ Such has not proved to be the case in other hands; and this, as well as the other forms of the *tent*, are in the present day rarely resorted to for the cure of hydrocele.

Seton.—The invention of this mode of treatment is ascribed to the Arabians. It appears to have remained in disuse for many years before the time of Pott. This excellent surgeon having experienced the severe effects of the methods of treatment already described, was induced to make trial of the seton, which he employed in numerous instances with success. His aim in the operation was to produce a cohesion without destroying the tunic, or causing it to slough. His improved mode of performing the operation has been particularly described by Sir James Earle,² who states that in less than twenty-four hours after the introduction of a seton consisting of coarse sewing silk, by means of an eye-probe carried through the canula of the trocar along the whole length of the sac, the scrotum and testicle began to inflame, and put on the appearance of a hernia humoralis, which was treated in the same manner as is usual in that complaint. When the swelling was diminished, and the parts were regaining their natural state, which happened about the tenth or twelfth day, the seton was gradually removed, a few only of the threads being withdrawn at a time.

Mr. Green, of St. Thomas's Hospital, has in recent years advocated this plan.³ His mode of performing the operation is nearly the same as that practised by Pott; but there is this important difference in the treatment, that the seton is retained a much shorter period, the average time being twenty-four hours, though it will vary in different instances. In three of the eight cases treated on this plan which are reported, the re-introduction of the seton was necessary. In one case the connective tissue of the scrotum suppurated, and in another an abscess formed in the vaginal membrane: both required to be punctured. In two instances the seton was obliged to be removed in a few hours, on account of the excessive

¹ *Mémoires de Chirurgie Militaire*, tom. iii, p. 407.

² *Treatise on Hydrocele*, p. 70.

³ On the Treatment of Hydrocele by Setons. St. Thomas's Hospital Reports, No. 1, p. 59.

pain which it produced. In the only three cases in which the seton operated mildly as well as successfully, one was cured in twenty-seven days, another in twenty-nine, and a third in about a fortnight. Mr. Green's account of these cases will induce few to take a favorable view of this plan of treatment.

The seton is a better mode of treating hydrocele than the other plans which I have described; but though a remedy less severe than these, it is not free from the same objection, of being very liable to produce more inflammation than is requisite for the cure of the complaint. It is, however, a very useful remedy in certain forms of the disease, and in vaginal hydrocele under certain circumstances. The plan I adopt is to pass an ordinary curved needle, armed with a single or double silk ligature, through the skin and sac in front, leaving a space of an inch or an inch and a half between the ends of the ligature, which may be tied loosely together to prevent the seton escaping. The two or four threads should be sufficient to fill up the apertures made by the needle, and thus prevent the admission of air and escape of blood. The fluid in the sac then drains away along the threads. Inflammation of the sac soon arises, and causes fibrinous exudation. This is known by the greater solidity of the tumor, and it is then necessary to remove the threads, usually from the second to the third or fourth day after the operation. The inflammation and swelling afterwards subside, and the hydrocele is permanently cured by adhesion. In this way of employing the seton, the sac is disturbed much less than in the ordinary method, and the inflammation excited is usually mild. I have resorted to it in many cases of encysted hydrocele of the cord and testicle; and as the tumor in these cases is usually small in size, the seton proves the best means of cure. In cases of simple hydrocele, after the failure of injections by others, I have also used the seton with success, and I have tried it, too, in cases where no other treatment has been adopted. The great objection to its use in simple hydrocele is the uncertainty of its operation. I have generally found it both a sure and gentle remedy, though occasionally I have been disappointed by its producing high inflammation, which it was impossible to control, and which speedily ran on to suppuration.

Injection is a plan of treatment alluded to by Celsus, who advised the use of a solution of nitre. Lembert, in his *Œuvres Chirurgi-*

cales (1667), recommended the injection of sublimate dissolved in lime-water, and he has recorded several cases in which it was attended with success. The practice appears, however, to have been for some time entirely laid aside, until it was revived about the middle of the last century by Mr. G. Munro, of Scotland, who at first employed spirits of wine, but subsequently, in consequence of the pain which it excited, substituted wine.¹ This plan was soon afterwards adopted by several other surgeons in Edinburgh. Mr. S. Sharp, of London, about the same time, also made trial of an injection of spirits of wine in a case of hydrocele, which was cured after very severe inflammation and the formation of two abscesses. Douglas, Le Dran, and Pott, in their works, disapproved of injections, which towards the end of the last century fell again into disrepute, owing, it seems, to the too irritating nature of the fluids employed. Sir James Earle,² surgeon of St. Bartholomew's Hospital, is entitled to the credit of having introduced injections into general practice by showing the advantages of a milder mode of proceeding; and those who compare the effects of this operation, practised in the manner he recommended, with the severe results of all those methods of treating hydrocele previously resorted to, will readily acknowledge the high value of this improvement.

The apparatus commonly employed for injection until recently was a trocar and canula, and an elastic caoutchouc bottle or brass syringe, capable of containing about four ounces of fluid, fitted with a movable brass tube furnished with a stop-cock. In this operation the hydrocele is to be punctured at the same place and in the same manner as in the palliative, but the canula is to be pushed in up to the hilt; and after the serum is wholly evacuated, the tube of the bottle or syringe is to be applied to the canula, and the stimulating liquid injected gradually until the tunica vaginalis is slightly distended. The quantity of liquid injected should always be much less than the amount of serum previously removed. The object of the operation is to apply a stimulating fluid to the entire surface of the sac; and this may be accomplished with a small quantity, as an ounce or an ounce and a half, by handling the scrotum, and in this way putting the fluid in motion after it is in-

¹ Munro on the Dropsy, 3d ed. p. 222.

² The first edition of his Treatise on the Radical Cure of Hydrocele by Injection appeared in 1791.

jected, so as to bring it in contact with every part of the serous membrane. When the tunica vaginalis is fully distended, part of the fluid is liable to be forced out, or to escape by the side of the canula into the scrotum, where it may cause inflammation and gangrene. If the fluid does not pass easily, the surgeon must immediately stop injecting; for most probably the canula has slipped out of the sac, so that by persisting the surrounding connective tissue would become infiltrated. Whilst the canula remains in its proper place there can be no impediment to the free passage of the fluid. After the injection has remained in for a few minutes,—from four to six minutes in the adult, and about two or three in younger persons,—the stop-cock tube must be withdrawn, and the fluid pressed out through the canula; which being removed, the aperture in the scrotum may be closed with a piece of adhesive plaster.

Different surgeons employed different kinds of stimulating fluids for injection. Sir James Earle gave the preference to dilute port wine, which is still often used in this country, in the proportion of one-third, or one-half, water. Solutions of alum, or of the sulphate of zinc (3j—3xvi), were also employed. Other fluids have been resorted to, as lime-water, cold and warm water, and dilute spirits of wine. The injection which I used formerly was either port wine diluted one-half, or lime-water; and my operations were attended with pretty constant success. I was subsequently led to try the tincture of iodine, and the results were equally satisfactory.

Iodine injections were first employed by Mr. Martin, formerly a surgeon in India.¹ He used the tincture in the proportion of 3ij—3vj of water; injected only a small quantity; and instead of afterwards withdrawing the fluid, allowed it to remain in the sac to be removed by absorption. In a report of cases of hydrocele thus treated at the Native Hospital of Calcutta,² it is stated that from the 9th of March, 1832, to 31st of December, 1839, 2393 cases were under treatment. Of these there were

Hindus,	1265
Mahometans,	1076
Christians,	52
Total,	2393

¹ Transactions of the Medical Society of Calcutta, vol. vii.

² Lancet, April 30, 1842.

And it appears that the failures were rather under one per cent.; a result which must be regarded as remarkably successful. Within the last ten years these injections have been extensively tried in Europe, and with a success which has led to their pretty general use in this country. I do not believe, as some have supposed, that iodine exerts any peculiar or specific influence on the serous sac. Like other injections it acts as a stimulant, stirring up inflammation, and like them also, it is liable occasionally to fail in persons insusceptible to inflammatory excitement, though the retention of a portion of the injection in the sac more certainly insures a favorable result. The apparatus for iodine injections is simpler and more portable than what is required for other fluids, and the operation is free from the risk of infiltrating the scrotum. For these reasons chiefly I have now for several years rarely resorted to any other injection. The only apparatus required, in addition to a medium-sized trocar, is a half-ounce glass syringe with a metallic nozzle which fits into a small stop-cock adapted to the canula. The metallic parts should be made of palladium, which is not acted on by iodine.¹ I employed at first injections of the strength recommended by Mr. Martin (one drachm of the simple tincture of iodine to three of water), but I found this too weak, and I have used latterly a compound tincture of the following strength undiluted,—iodine ℥ij, iodide of potassium ℥ss, spirits of wine ℥j,—injecting from two to three drachms, and allowing this to remain in the sac for five minutes. The greater part of the fluid is then withdrawn, about half a drachm only being left behind in the sac. Some surgeons are content to inject a drachm of the tincture, and to leave it in the sac, which answers quite well. I have not found the tincture employed in this way in adults at all too stimulating. In operating, however, on persons under puberty, I dilute it one-half.

I generally perform the operation on the patient standing, but it may be done equally well in the recumbent position. Directly the stimulating fluid becomes lodged in the vaginal sac, the patient generally feels sick and faint, and experiences pain in the part, and in the cord, with uneasiness in the loins. The pain is sometimes so

¹ Palladium, being elastic, is a better material for a canula than silver. If made of silver the instruments should be immediately cleansed after use by dipping them in a solution of the hyposulphite of soda (\mathfrak{J} j— \mathfrak{J} ij), which will prevent the iodine corroding the silver. This solution is also useful in removing iodine stains from the fingers.

severe that the removal of the injection becomes necessary before the expiration of the usual period. The amount of inflammation excited by the operation cannot, however, be estimated by the degree of pain suffered at the time. There is great difference in persons in their tolerance of stimuli, inflammation being more readily excited in some than in others, but its amount and intensity by no means depend on the susceptibility of individuals to pain.

The success of the operation of injection depends a good deal on the after-treatment. If too much inflammation be apprehended, means must be taken to moderate it; on the other hand, as a certain degree of inflammatory action is essential to the cure, if no pain or other symptoms arise, the surgeon must endeavor to excite it. When symptoms of inflammation arise, which generally happens in the course of a few hours, I recommend the use of a suspender, and rest in the recumbent position until the acute symptoms begin to subside. If these precautions be neglected, there is risk of more inflammation being excited than is necessary. Should no symptoms of inflammatory action be evinced in the course of eight or twelve hours, the patient should be encouraged to move about; and the testicle may be handled, so as to occasion slight friction between the surfaces of the tunica vaginalis. If the swelling should become considerable, and the pain and constitutional disturbance be great, the activity of the inflammation must be moderated by saline purgatives, or tartar emetic, as in the treatment of acute orchitis. I have never had occasion to do this, the chief difficulty which I have experienced having been to obtain an adequate amount of inflammation. It may, however, run too high, and go on to suppuration. This has not occurred after any of my own operations, but I was once summoned to a case in which suppuration had taken place after injection by another surgeon, and had to incise the sac. Sir B. Brodie remarks, that he has never known suppuration to occur after the operation by injection, except in West Indians, and in them only in three out of a great number of cases. In these cases the injected fluid was not made stronger than usual, but was even retained a shorter time—in one case only a single minute—and yet the inflammation was excessive; there was violent pain, and great constitutional disturbance.¹ I have operated very often on persons

¹ London Medical Gazette, vol. xiii, p. 93.

from warm climates, but have not found injections productive of higher excitement in them than in residents of this country.

The application of collodion to the scrotum a day or two after injection, has been recommended by Velpeau. I have tried it in a few cases, but without any evident benefit, whilst the irritation produced by the collodion was so great as to prove very annoying to the patient.

I have mentioned that after injection there is a greater likelihood of the inflammation proving too mild than too acute. Yet it is not necessary to excite a sharp attack, for it is surprising how slight a disturbance will sometimes be sufficient for the cure, so that the surgeon is rarely disappointed in the result of the operation. I have upon several occasions been apprehensive of failure, owing to the mild character of the inflammation of the sac, the patient not having been confined a single day, and yet there has been no return of the disease. In cases in which the tenderness and swelling have been so slight as to threaten a failure, I have, on the third or fourth day after the operation, introduced a small trocar and removed the fluid in the sac, and then repeated the injection, throwing in a drachm of the tincture of iodine, which has been left there. This succeeded perfectly in two cases recently, in one of which there were only three drachms of fluid in the sac at the time of the second operation. But if the quantity of fluid should be too small to admit of the safe introduction of a very small trocar, the surgeon may pinch up a portion of the scrotum and sac between his finger and thumb, and pass a seton consisting of two or four threads of silk through them by means of a slightly curved needle, which will insure a cure. But iodine injection so seldom fails,¹ that it is generally better to wait the result of the operation, even when its effects are mild, rather than resort to a measure which is not free from the risk of producing suppuration. The seton can be passed at a later period, if the injection prove a failure. In the following case, unusual difficulty was experienced in exciting inflammation of the sac. In 1852, a gentleman, aged forty, slightly dyspeptic, who had just arrived from the East Indies, where he had been resident many years, applied to me for the cure of a small hydrocele on the right side, which had been forming about six months. I tapped it on the

¹ Some interesting cases of failure of injection arising from vaginal hydrocele being complicated with encysted hydrocele of the testicle, will be found at pp. 169-70.

4th of June, and drew off about three ounces of serum, and found the testicle healthy. The fluid quickly returned, and on the 15th I removed two ounces, and injected two drachms of the compound tincture of iodine, kept the fluid in eight minutes, and left a small quantity in the sac. No inflammation ensued. The patient was allowed to walk about and take his ordinary diet with wine, and on the second day I well rubbed the surfaces of the sac together for several minutes, yet no inflammation arose. On the 18th I nipped up the scrotum and sac and passed a seton of double silk thread. The inflammation which followed was very mild, though the patient continued to walk about with the seton in. On the 23d it was removed, and I was in hopes that the inflammation produced would prove sufficient for the cure of the hydrocele. All evidence of inflammation quickly subsided, but not the swelling produced by the effusion. My patient being very anxious to return to India cured with as little delay as possible, and being myself doubtful of the ultimate success of what had been done, I introduced, on the 1st of July, a fine exploring trocar and drew off half an ounce of serum, and then passed a needle armed with a thick silk ligature moistened with the tincture of iodine through the canula, which being withdrawn, the seton of two threads was left in the sac. This produced slight tenderness and a somewhat solid swelling, and on the 3d the seton was withdrawn. The inflammation subsided slowly, and the patient left England on the 7th. I received a letter from him from Syria nearly a month afterwards, in which he stated that the induration and swelling had subsided, and that he was cured.

I seldom inject a hydrocele when the fluid amounts to more than ten or twelve ounces, because the extent of the serous surface in large hydroceles is liable to render the effects of this treatment severe. In these cases it is better to draw off the fluid, and then wait until a smaller quantity is formed, when the operation may be undertaken with less risk. The surgeon should also be careful to ascertain that the dropsical effusion is not dependent on existing disease of the testicle. A man was admitted into the London Hospital with a double hydrocele on purpose to undergo the operation for the radical cure. He had been suffering for some time previously from disease of the larynx, which increased soon after his admission, and caused suffocation and death. On examination of the testicles, deposits of concrete pus were found in the substance

of both the glands. In this case, had his state of health permitted of an operation, after removal of the fluid the morbid condition of the testicles would probably have been detected, and injection, which could only have done harm, would have been abandoned. The fluid around a diseased testicle by producing pressure sometimes causes pain, and it may then be evacuated with benefit; but I need scarcely add that to attempt the permanent removal of a hydrocele whilst the original disease remains unsubdued, would be both fruitless and hurtful. The affection of the gland must be treated without reference to the effusion, and it will commonly be found that as the former subsides the hydrocele likewise disappears. Thus, in several cases of hydrosarcocele consequent on orchitis, in which after drawing off the fluid the testicle has been found tender as well as enlarged, I have succeeded by small doses of mercury and local treatment in subduing the chronic inflammation of the gland and effecting the cure of the hydrocele. In some instances, however, in which inflammation of the testicle or epididymis is the primary disease, the hydrocele remains long after morbid action has ceased. The case must then be regarded in the same light and treated in the same way, as ordinary hydrocele. An enlarged and indurated testicle or epididymis does not, then, constitute an absolute objection to the operation for the radical cure of hydrocele; but the proceeding would not be advisable unless the original disease had been long in abeyance.

In favorable cases the operation of injection is followed by only slight pain, tenderness, and swelling, and by scarcely any constitutional disturbance; and when performed with care it is devoid of danger. The chief risk in the old mode of injection arose from the stimulating fluid being injected into the connective tissue around the tunica vaginalis instead of into the sac, owing to the canula slipping out of the opening. This accident was sometimes succeeded by diffuse inflammation with suppuration and gangrene, and in persons advanced in life or of a debilitated constitution it has caused the loss of life. An unfortunate case of this kind must be treated upon the same principles as a case of extravasation of urine. Free incisions should be made into the scrotum at a depending part, in order to allow of the escape of the irritating fluid, and fomentations and cataplasms afterwards applied. If gangrene ensue, the patient's powers will require to be supported by wine, brandy, and

bark or ammonia. This accident might always be avoided by proper care and caution: even when it did occur, it was not invariably succeeded by serious consequences, and two cases have come to my knowledge in which dilute port wine was injected into the scrotum without any ill effects resulting. Another accident said to attend this operation is an attack of tetanus, a few cases of which have come to my knowledge. It is, however, so very rare an occurrence, many thousands having undergone an injection without an attack, that the liability cannot be regarded as constituting the slightest objection to the operation.

In six or seven days after injection the pain and swelling begin to subside, and in about three weeks the cure is usually accomplished, all the effused fluids having been removed. But sometimes, especially if the inflammation has been unusually severe, this process takes place more slowly, the cure not being completed for two or three months. It was supposed at one time that the cure by injection resulted from complete adhesion of the two surfaces of the tunica vaginalis; but more recent observations have shown that in many instances the adhesions are only partial, and that in some cases a cure is effected without any adhesion whatever, the inflammation producing such an alteration in the secretory action, that the serum ceases to be poured out in excess. When the adhesion is complete the cure is permanent, and the patient free from all liability to a relapse; but if the hydrocele be removed without perfect obliteration of the cavity, the relief may be only temporary, and the same causes which originally gave rise to the hydrocele might, at a future period, occasion a return of it. Instances are known in which a hydrocele, after having been removed by injection, has reappeared at the end of ten, and even twenty years. Some years ago I tapped a hydrocele which had been cured by injection by Sir A. Cooper twenty-five years before, and had returned only during the previous six months.

In double hydrocele injection should not be performed on both sides at the same time; for not only may the effects of a double operation prove very severe, the degree of inflammation and suffering produced being always uncertain; but the injection of one has been known to succeed in curing both, by the extension of the inflammatory action from one sac to the other, their external surfaces being nearly in contact. A man, fifty years of age, entered Dupuy-

tren's clinical ward at the Hôtel Dieu with double hydrocele. That on the right side was large and of old standing ; the other was small and recent. Dupuytren punctured and injected the first with wine, which caused the usual reaction, and the disease was cured on both sides. He had observed the same phenomenon several times.¹ I am inclined to think these patients were fortunate, and that few surgeons have met with similar success from a single operation. The second hydrocele may be injected as soon as the effects of the first operation have subsided, and its result has been ascertained.

I have injected hydroceles in adults of all ages up to seventy, but not later. It is desirable to avoid operations on persons far advanced in life, for even the injection of a hydrocele, by exciting a low form of inflammation, may lead to serious consequences. Very old people should be content with palliative treatment.

A careful inquiry into the merits of the various modes of effecting the radical cure of hydrocele fully establishes the superiority of the treatment by injections, especially iodine. The older surgeons committed a great error by endeavoring to excite too high a degree of inflammation ; for not perceiving that the disease could be arrested by altering the action of the vessels of the part, they sought to obtain the closure of the natural cavity, which, moreover, they endeavored to effect by producing suppurative inflammation and granulation, instead of by the gentler process of adhesion. The improvement in treatment consists in reducing the amount of inflammation to the lowest possible standard, the chief risk incurred arising from the plans employed proving too mild to be efficacious and sure. Injection has now been largely tried in this and other countries ; and experience warrants us in asserting that, though it is not an infallible remedy, of all the plans hitherto practised it combines the greatest number of advantages. The pain attending it is slight ; its effects are mild, and at the same time tolerably sure ; if properly performed, it is free from danger ; and it frequently succeeds without altering the natural condition of the parts. I know it is a question whether the cure by adhesion, though less perfect than that in which the disposition merely of the vessels is changed, is not upon the whole preferable. In the latter there is a possibility, if not a probability, of a relapse at some future

¹ *Lancette Française*, Février, 1837.

period, the causes conducing to hydrocele still remaining; whilst the inconvenience produced by an impediment to the free movements of the testicle, in cases cured by adhesion, is regarded as too trivial to be any disadvantage. But, in the absence of data showing the degree to which the disease is liable to return after the cure without adhesion, I feel perfectly satisfied with such a result, and much prefer leaving a patient exposed to the doubtful chance of a relapse, than subjecting him to severer treatment in order to make sure of exciting sufficient inflammation to secure adhesion and obliteration of the sac. Injections, however, are not capable of effecting a cure in every case, nor are they adapted for every constitution. The judicious surgeon, therefore, whilst resorting to them as his ordinary remedy, will be prepared to avail himself, in particular and difficult cases, of other means more certain in their effects, such as the seton and incision.

SECTION II.

CONGENITAL HYDROCELE.

In simple hydrocele the original communication between the cavities of the peritoneum and of the tunica vaginalis is permanently obliterated; but it sometimes happens that fluid accumulates around the testicle in cases in which the obliteration has not been completed, constituting the variety termed *congenital hydrocele*. The opening of communication between the two cavities is usually small in size, about sufficient to admit a crow's or goose's quill. In these cases it is difficult to determine whether the fluid is secreted in the abdomen or in the tunica vaginalis; since, if poured out by the peritoneum, it must naturally tend to accumulate in the more depending cavity. But as the fluid usually becomes absorbed after the communication between the abdomen and tunica vaginalis has been obliterated by pressure, it seems probable that the fluid is originally formed in the abdomen. There is rather a rare variety of congenital hydrocele, in which the testicle is retained in the abdomen or inguinal canal, whilst the peritoneum, prolonged for a short distance into the scrotum, forms the cyst containing the fluid, which is covered only by the integuments and superficial fascia. A hydrocele presenting the same characters as the congenital sometimes follows a late transition of the testicle, unaccompanied with a

hernial descent. This is also a case of rare occurrence; but I once met with an instance in a lad eighteen years of age.

Symptoms.—A congenital hydrocele usually appears soon after birth, forming a smooth, transparent, fluctuating swelling, which is prolonged into the inguinal canal, and receives an impulse when the child coughs or struggles. By gentle pressure the fluid may be gradually forced up into the abdominal cavity, and as the tumor disappears the testicle becomes perceptible in the scrotum. The same symptoms are produced by this complaint in the adult; it has also been noticed that the hydrocele is larger at night than when the patient first rises in the morning. M. J. Cloquet observed, in two cases of congenital hydrocele in adults, that the hand experienced a tremulous and peculiar rustling sensation in pressing the fluid into the abdomen.¹

Diagnosis.—Congenital hydrocele is easily distinguished from ordinary hydrocele by the absence of a defined boundary to the tumor at its upper part; by the impulse received on coughing; and by pressure, causing the disappearance of the swelling, and rendering the testicle perceptible. A congenital hydrocele might be mistaken for a reducible intestinal hernia, which also disappears on pressure, and dilates and receives an impulse on coughing; but the nature of the disease is indicated by the fluctuation and transparency of the swelling, and by the absence of the gurgling sound accompanying the return of the intestine, and by the circumstance that if the fluid be returned into the abdomen whilst the patient is in the recumbent position, and pressure with the finger be lightly made at the ring, on his assuming the erect posture the fluid will imperceptibly escape into the sac, and cause a gradual return of the swelling, though nothing has been felt to pass the ring, and the surgeon is quite certain that the intestine cannot have descended.

I once met with a case of congenital hydrocele in a boy three years of age, the diagnosis of which was attended with unusual difficulty; so much so that the case had been mistaken by an experienced hospital surgeon. The swelling had been noticed only a few months, and it presented the characters of simple hydrocele. There was no impulse received on coughing, and the swelling was not immediately reduced by pressure and by placing the boy in the recumbent posture. The father stated, however, that the swelling

¹ Recherches sur les Causes et l'Anatomie des Hernies Abdominales. p. 95.

was decidedly less in size in the morning than at night, and there appeared to be a slight thickening in the direction of the cord. Mr. Buchanan of Stepney, who sent the case to me, also mentioned that he had succeeded by long-continued pressure in reducing the size of the swelling. I placed the boy in the recumbent posture, and kept up steady pressure on the tumor for some time. After fifteen minutes it was perceptibly smaller, in half an hour it was diminished one-half, and at the end of fifty minutes it was only a quarter its previous size ; but I did not succeed in causing its entire disappearance, the father objecting to my continuing my efforts. I believe that the aperture of communication in this case was scarcely so large as a pin-hole. In no other way can I account for the very gradual subsidence of the tumor on pressure. The small size of the opening would also explain the want of impulse. The hydrocele was quite cured in a few weeks by pressure on the inguinal canal.

Treatment.—In the treatment of congenital hydrocele the primary object is to occasion an obliteration of the neck of the sac, so as to cut off the communication with the abdomen. For this purpose the patient must constantly wear a truss made to press firmly on the inguinal canal. After adhesion has taken place the fluid usually disappears : its removal may be encouraged by the application of a stimulating lotion, or may be effected by acupuncture. This plan is usually successful when adopted in early life ; but if after many months' trial it is found to fail, the truss should still be worn, not only to prevent the passage of fluid from the abdomen into the sac, but also to impede a hernial descent, and to afford a further chance of obtaining obliteration of the opening. This form of hydrocele very rarely requires injection for its cure, and the operation should never be performed unless the surgeon is fully satisfied that a communication no longer exists between the sac and abdomen. If the sac be injected before closure of its neck, peritonitis is very liable to ensue, and to endanger the life of the patient. Desault, Dupuytren, and other surgeons, after puncturing the sac and evacuating the fluid, have injected a stimulating liquid, firm pressure being made upon the ring, and continued for some time after the operation ; and the practice has in some instances been attended with success. But in other cases peritonitis has been excited, and death has followed. It would not be difficult, by a little cautious management, to avoid injecting fluid into the

peritoneal cavity ; but as the object of the operation is to excite inflammation in the sac of the hydrocele, the great risk is of the extension of the inflammation along the continuous serous surface to the peritoneum generally, the prevention of which cannot be secured by the pressure afterwards maintained at the ring. This proceeding, therefore, is not justifiable ; for no one is warranted in undertaking an operation exposed to such danger for the permanent removal of an inconvenience which can be partially remedied by other means free from risk. A strong motive for persevering in the attempt to cure congenital hydrocele in early life by means of pressure, is the risk of inflammation to which the testicle is afterwards liable, extending to the sac, and thence to the peritoneum in the abdominal cavity,—an inconvenience similar to that remarked in the case of imperfect transition of the testicle. Cloquet examined the body of a man, aged fifty, affected with congenital hernia, whose thoracic and abdominal viscera were perfectly sound ; but the abdominal cavity contained six pints of yellow serum mixed with flocculent albumen, which appeared to have originated in disease of the testicle, and the extension of inflammation from the tunica vaginalis to the peritoneum.¹

SECTION III.

ENCYSTED HYDROCELE OF THE TESTICLE.

In this form of hydrocele, fluid is effused into an adventitious cyst or cysts distinct from the sac of the tunica vaginalis. They may be developed in two situations : 1. Beneath the visceral portion of the tunica vaginalis investing the epididymis ; 2. Between the testicular portion of the tunica vaginalis and the tunica albuginea, which are thus separated from each other. The first is by far the most common situation, the latter being very rare. These cysts are composed of a thin delicate membrane, and the fluid contained in them differs from that of simple hydrocele in being perfectly limpid and colorless, and nearly free from albumen. The fluid contains molecular granules in great abundance. In the larger cysts formed on the epididymis, the fluid, instead of being limpid, often presents an opaline opacity arising from the presence of spermatozoa.

¹ Lib. cit. p. 144.

1. Small spherical or oval cysts not larger than a pea, and even smaller, may frequently be found beneath the serous membrane covering the head of the epididymis, in which they produce a slight depression. In several instances I have found as many as five or six perfectly distinct cysts connected with this part. Sometimes one or two small cysts are so embedded in the substance of the epididymis, that they cannot be recognized without dissection. Though these minute cysts generally contain a limpid serum, I have found them filled with a fluid of a milky hue, and I have even observed matter like pus tinged with blood. These accidental cysts, developed in the upper part of the epididymis, sometimes

Fig. 15.



Cysts developed in the epididymis:
a, a. Small cysts slightly elevating the tunica vaginalis.

b, b. Small pedunculated cysts.

c. Small process or fold of the serous membrane attached at the junction of the epididymis to the body of the testicle.

project the tunica vaginalis before them until they become so far separated from the part where they were originally formed, as to be attached only by a narrow peduncle formed by the contracted tunica vaginalis. Such is the mode of development of those small pedunculated cysts containing a limpid fluid often found hanging from the head of the epididymis, which were erroneously supposed by Morgagni to be hydatids. I have on many occasions observed them in the different stages of their production (*vide* Figure). Thus I have seen a pedunculated cyst attached at one part, whilst close to it there was a cyst of a similar nature embedded in the substance of the epididymis. In other instances I have found the cyst very

prominent, but still connected by a broad attachment of the tunica vaginalis reflected over it, the membrane not having as yet contracted to form the narrow neck. In all these cases the prolongation of the tunica vaginalis investing the cyst could always be demonstrated by a little careful dissection, and between this membrane and the cyst some minute red bloodvessels were generally seen ramifying. These pedunculated cysts never acquire a large size; I have seldom found them to exceed that of a currant. From the exposed situa-

tion of the testicle, they are liable to be ruptured, the vestiges of them consisting of fimbriated folds of membrane; but this is not a common occurrence. I have seen the delicate peduncle by which the cyst was attached as long as three-quarters of an inch. M. Gosselin states that similar cysts are sometimes developed in the little appendage to the tunica vaginalis so often found connected with the upper part of the testicle.¹ This I have never seen. Small cysts of a somewhat irregular form and remarkable firmness are occasionally found at the side of the epididymis, near its middle part. The cysts contain a limpid fluid, but owing to their hardness and semi-transparency they closely resemble little bits of enchondroma. The hardness results from extreme tension of the walls of the cyst.

So common are small cysts connected with the epididymis in the various states and stages I have described, that it is impossible to examine many testicles, especially of persons beyond the age of puberty, without finding them. According to M. Gosselin,² they are liable to be developed from the period of puberty to the age of thirty or thirty-five, but are rare at this period. After the age of forty they are very common, having been met with by him in at least two-thirds of the testicles examined. Now when one or more of these cysts, instead of becoming pedunculated, enlarge so as to form a tumor in the scrotum, they constitute the form of hydrocele, called from its original seat, *encysted hydrocele of the epididymis*. I have observed this description of hydrocele in all its various modifications, from the enlargement simply of a single cyst to the complication occasioned by the varied development of several. As a cyst enlarges the epididymis becomes flattened, and displaced to one side, whilst the testicle is found either in front or at the bottom. It is sometimes at the side, but rarely at the posterior part of the swelling. In the adjoining woodcut (Fig. 16) of a specimen in the London Hospital College, the cyst is above the testicle, which is so displaced by it that its anterior edge is directed downwards. The tumor is in general of smaller size than a simple hydrocele, the

¹ Archives Générales de Médecine, 4e série, t. xvi, p. 27.

² M. Gosselin has given an elaborate account of the cysts connected with the epididymis in two papers published in the 16th volume of the Archives Générales de Médecine. He makes two varieties of them, the small and large, and states truly enough that spermatozoa are found only in the latter. The smaller cysts, however are simply the early stage of the larger.

fluid commonly not exceeding three or four ounces in quantity.

Fig. 16.



I have, however, removed as much as thirty-two ounces from a single cyst. When the hydrocele is composed of several cysts, they are seldom of large size, but form a cluster more or less complicated and irregular, according to their size and number.

A curious sacculated arrangement produced by the development of numerous contiguous cysts may be seen in the annexed figure (Fig. 17), taken from a specimen dissected by me, and preserved in the London Hospital College. Part of the walls of the cysts are cut away to exhibit their interiors. The cysts are liable to inflammation, which causes more or less alteration in the quality and appearance of the fluid contained in them. It may become very albuminous, and assume the straw or amber color of ordinary hydrocele; and the

Fig. 17.

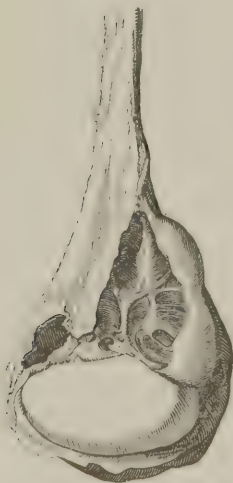
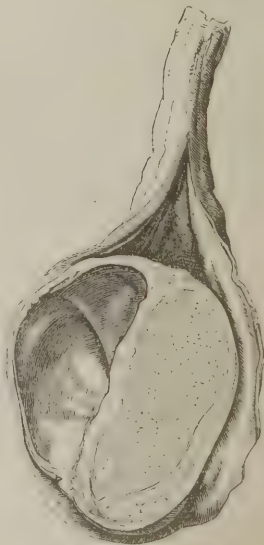


Fig. 18.



cyst may contain lymph, form adhesions, or be lined with a false membrane, the fluid being thick and turbid. The cysts are liable

also to become filled with blood, constituting a variety of hæmatocele.

2. When a hydrocele forms between the tunica albuginea and the inner layer of the tunica vaginalis, the cyst is generally single and of small size. As it grows, it separates the two membranes, which are naturally closely adherent to each other. This is a very rare form of hydrocele. A specimen, which I discovered accidentally in dissection, is represented in the annexed woodcut (Fig. 18). The cyst, which contained about two drachms of fluid, is situated along the front of the testicle, and is a little thickened. One section of it is preserved in the London Hospital College; the other in the Hunterian Museum. Sir B. Brodie has described a very similar case. A man who died in St. George's Hospital was discovered after death to have had encysted hydrocele of one testicle. The cyst was composed of a thin membrane, containing a colorless fluid, and was of about the size of a walnut; it was attached to the anterior part of the testicle, below the epididymis. The inner layer of the tunica vaginalis was reflected over one side of the cyst, while the cyst on the other side rested on the fibrous membrane of the tunica albuginea, by which it was in consequence separated from the glandular structure of the testicle.¹ In the Museum of St. Thomas's Hospital there is a specimen of a small cyst developed in the epididymis, which in its subsequent growth had extended on the testicle, separating the tunica vaginalis from the tunica albuginea.

In examining a healthy testicle I once found six or seven small cysts about the size of currants, studding the surface of the loose portion of the tunica vaginalis. Two of them were situated in a part of the membrane extending up the cord. They projected internally, and contained a limpid fluid. I have twice since seen a similar kind of cyst in the same portion of the tunica vaginalis. Similar adventitious cysts have also been observed on the internal surface of the sac of a simple hydrocele, and a preparation of the kind is contained in the Hunterian Museum. If a cyst developed in this membrane were to increase to any size, it would constitute a swelling which might be appropriately termed an *encysted hydrocele of the tunica vaginalis*.

I have made many minute examinations of the cysts in encysted hydrocele in order to make out the mode in which they form. Their

¹ London Med. and Phys. Journal, vol. lvi, p. 522.

close connection with the excretory apparatus of the testicle led me to suppose that they might originate in a morbid dilatation of the tubes, but I am satisfied from repeated investigations that they are independent formations—simply serous cysts developed in the connective tissue between the collected tubes and their investing serous tunic. In several specimens adhesions have been noticed between the surfaces of the tunica vaginalis, and during life I have observed the gradual formation of the cysts some time after an attack of epididymitis.

A circumstance of much interest in connection with this form of hydrocele, is the occurrence of spermatozoa in the fluid contents of the cyst, a discovery made by the late Mr. Liston in 1843.¹ Since this period I have met with them in a large number of cases of encysted hydrocele, indeed, in the majority of instances in which I have searched for them. They were found in subjects of various ages from thirty to seventy-five, and in cysts of all sizes from that of a filbert to the largest which the hydrocele attains. The fluid in some instances contained these bodies in remarkable abundance; in others they existed sparingly. When very numerous, they give to the fluid an opaline opacity, or an appearance resembling cocoa-nut milk, which is so characteristic as to enable the surgeon to predicate their presence from the appearance of the fluid alone without minute examination. If the fluid be allowed to remain at rest in a glass vessel, the spermatozoa subside to the bottom, rendering the lower portion more opaque than the upper. The fluid also exhibits slight traces of albumen, when tested in the usual way, which is not the case with the ordinary pellucid colorless fluid of encysted hydrocele. The spermatozoa were often as lively as in fresh semen. They were observed more frequently in the larger cysts than in the smaller. I once found them in fluids removed from two distinct cysts connected with the epididymis of a man about sixty years of age. I have detected them in the fluid from encysted hydroceles tapped for the first time, and also in the examination of small cysts connected with testicles removed after death. In a man, aged seventy-five, I removed from an encysted hydrocele, which had never been tapped before, as much as thirty-two ounces of fluid, which contained an abundance of spermatozoa. They were also

¹ The discovery appears to have been made about the same time and independently by Mr. Lloyd. Vide *Medico-Chirurgical Trans.* vol. xxvi, pp. 216, 368

detected in fluid taken from a man aged fifty-four, who stated that the tumor had existed for twenty years, and had never been operated on before.

Various opinions have been broached to account for the occurrence of spermatozoa in the fluid in this form of hydrocele. Mr. Liston suspected that their presence might be explained by the circumstance that the cyst was formed by dilatation of a seminiferous tube. This view, however, is erroneous, for it has been shown that the cyst is quite distinct and completely separated from the ducts, though in close proximity to them. Others have imagined that these bodies were accidentally introduced, owing to a wound of an adjoining duct in the operation of tapping; but this is disproved by their having been observed in cysts when tapped for the first time, and in others which have never been opened until after death. Mr. Paget suggests, as the most probable explanation, "that certain cysts seated near the organ which naturally secretes the material for semen, may possess a power of secreting a similar fluid."¹ This explanation has never appeared to me satisfactory. The cysts in which spermatozoa are found are not formed in connection with the secretory portion of the organ, but with the excretory, so that the analogy with the cysts in the thyroid and mammary glands which is made in support of this view, is not borne out. The perfect condition of the spermatozoa in some of these encysted hydroceles is also opposed to the theory of their being formed in the cysts.² The explanation which I offered shortly after the discovery of spermatozoa in these cysts³ was, *that their presence was probably owing to the rupture of one of the tubes of the epididymis, and the escape of semen into the sac of the hydrocele.* The close proximity of the efferent tubes to the cyst, the slight texture of the ducts, the thin and delicate walls of the sac, and the liability of the part to contusion and injury when a swelling even of moderate size exists, seemed to favor this view. The circumstance that spermatozoa are never

¹ Medico-Chirurgical Trans. vol. xxvii, p. 401, and Surgical Pathology. vol. ii, p. 53.

² It is deserving of notice that in the disease of the testicle which is more nearly analogous to the cystic disease of the breast, viz., the true cystic growths formed by a morbid dilatation of the ducts of the rete testis, spermatic filaments are never found in the fluid contents of the cysts.

³ First Am. edition of this work, Appendix, p. 567, and Edinburgh Journal of Medical Science, Sept. 1849, p. 1023.

found in very small cysts, shows that they are not originally formed there, but are a subsequent addition to their contents.¹

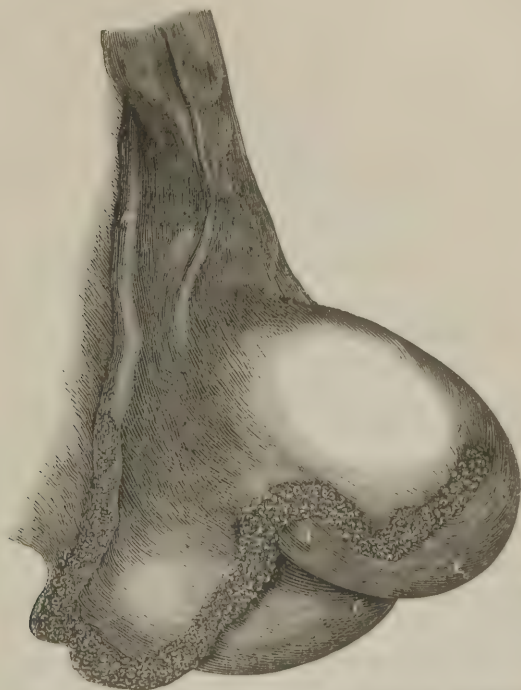
In investigating the history of the cases of encysted hydrocele containing spermatozoa which came under my notice, I found in a majority of instances that the swelling had gradually formed after an injury to the testicle; and in two cases it was clear that a small cystic swelling had long existed in a stationary state, but after a slight blow had enlarged. So that it was most probable that a duct had been ruptured by the contusion, and that the irritation consequent on the injury, and perhaps on the addition of the spermatozoa to the fluid contents of the cyst, had led to its further growth. After several attempts to establish by anatomical examination the existence of a communication between the duct and the cyst of the hydrocele, which failed owing to the difficulty of injecting the tubes in the head of the epididymis, I have recently, with the assistance of Mr. John Quekett, succeeded in detecting a communication in two instances. A man, aged fifty-three, died in the London Hospital in July, 1854. His testicles being enlarged, were removed. On laying open the tunica vaginalis, I found a cyst containing about four drachms of milky fluid attached to the head of the epididymis in both testicles. At my request Mr. Quekett inserted a tube into the vas deferens, and injected the glands with mercury. The metal passed into the epididymis, and escaped freely into the cyst attached to it in both organs. The ducts of the epididymis, loaded with mercury, were found ramifying over the walls of the cyst, having been drawn out and expanded by the growth of the hydrocele, as may be seen in the adjoining figure taken from one of the specimens preserved in the Hunterian Museum. On examination of the interior of the cysts, the open mouth of the duct from which the mercury had escaped was distinctly visible. There was an oval opening in the membrane of the cyst, the edges of which were even and rounded, and at a point in the centre of this opening globules were seen escaping from a minute aperture in one of the ducts. The open mouth of the duct, into which a bristle has been passed, may be distinctly seen in the preparation.

The examination of these two testicles affords the true solution

¹ In several instances in which M. Gosselin succeeded in injecting the ducts of the epididymis both with mercury and turpentine, he never found the least trace of the injection in the small cysts.

of the difficulty which has hitherto existed in satisfactorily accounting for the presence of spermatozoa in encysted hydroceles. It

Fig. 19.



A, vas deferens; C, testicle; D, epididymis, with the ducts expanded over the cyst; E, cyst.

appears that as the hydrocele increases in size, the delicate tubes are drawn out and extended over the cyst, a position in which they are peculiarly exposed to accidental rupture. That the opening was of old standing, and not produced by the pressure of the column of mercury, is shown by the character of the aperture. It may be objected that if such a patent opening existed, the hydrocele should go on steadily increasing from the ingress of the spermatic fluid, and not remain stationary, as we often witness in these cases. We can readily conceive, however, that in the full distension of the cyst, the ducts would be so compressed and obstructed as to cause the seminal fluid to flow through the other efferent tubes. If the hydrocele were emptied by puncture, the channel would

again become free, and fresh spermatozoa would then enter the cyst. In some instances the opening of the duct appears to become permanently closed, so that after the puncture of the cyst there is no return of the hydrocele, as in the following case. An old man consulted me on account of a large hydrocele which extended up to the abdominal ring, the testicle being situated at the bottom of the scrotum. It was on the right side, had been forming for eight years, and had never been tapped. I introduced a trocar, and drew off thirty-two ounces of a milky fluid, which contained myriads of spermatozoa. I saw him two months afterwards, and found a fulness on the right side of the scrotum from the collapsed sac, but there was no return of the hydrocele.¹

The ducts of the epididymis, when extended over the cyst, as represented in Fig. 19, must not only be liable to rupture from a slight contusion, but also to be punctured in the operation of tapping; and no doubt they are occasionally wounded in this way. This appears to have happened in the following case. A man, aged fifty-one, had an encysted hydrocele, which was tapped by one of my colleagues, and about an ounce of limpid fluid was removed from two distinct cysts. He was again tapped by the same surgeon a month afterwards, and on neither occasion were any spermatozoa detected in the fluid removed. In a few weeks afterwards he applied to me in consequence of a return of the swelling, attended with a good deal of uneasiness. I performed acupuncture in three places, and in the drops of fluid which escaped, spermatozoa were found.

Spermatozoa are stated to have been found in some two or three instances in fluid removed from the tunica vaginalis. It is not improbable that these cases may have been encysted hydroceles mis-

¹ The above explanation of the occurrence of spermatozoa in hydroceles is in complete accordance with the interesting observations of Professor H. Luschka in a Paper on the "Appendicular Structures of the Testis" (Virchow's Archiv. f. "Path. Anat. u. Physiol.," vol. vi, p. 310, 1854), with which I have only recently been made acquainted by Mr. Busk in a note in his recently published translation of Wedl's Pathological Histology, p. 465 (Syd. Soc.). Luschka states that the cavity in many cases communicates so openly with the seminiferous canal that the hydatid may be taken to represent a vesicular dilatation of the extremity of the latter, projecting beneath the epididymis. The communication with the seminal tube when narrower can, however, always be demonstrated by the introduction of a bristle, or by mercurial injection. But not unfrequently no communication can be discerned, and in these cases the cysts contain no seminal elements. Professor Luschka seems to have found less difficulty in detecting the communication with a seminal tube than I experienced.

taken for simple. The diagnosis is sometimes very difficult, and in the case of the cyst examined by Mr. Paget, this error was made before death by a hospital surgeon. I have, however, found spermatozoa in the sac of the tunica vaginalis, and the following case will account for their presence. A man, aged fifty-four, died in the London Hospital of disease of the kidneys, of one of the ureters, and of the bladder, which appeared to be consequent on a severe blow on the loins about six weeks before. The tunica vaginalis of one of the testicles contained two ounces and a half of slightly opaque fluid, in which a few spermatozoa were found. There were three small cysts containing fluid, immediately connected with the epididymis, and also at one spot an irregular ragged membranous appearance, evidently caused by the rupture of a cyst. It is most probable that the spermatozoa had escaped from this cyst, which may indeed have been burst at the time of the injury. I have examined the fluid from the tunica vaginalis in a large number of instances without finding these bodies, and I believe their occurrence in vaginal hydrocele to be extremely rare.

Symptoms.—An encysted hydrocele of the testicle, or rather of the epididymis, commences imperceptibly, and increases very gradually, and in general without producing pain. After it has attained a certain size, as that of a grape or walnut, its growth is often arrested, and it remains stationary for many years, causing neither pain nor inconvenience. In this state the swelling is perceptible through the scrotum, the testicle appearing of an irregular form, or as if it were double. On careful examination the cyst may be detected projecting either at the upper part, on one side, or behind the testicle, forming a tense fluctuating tumor connected with the gland, and moving with it. In other cases the cyst continues to increase until it forms a tense elastic swelling, twice, thrice, or even four times the size of the testicle, but which seldom becomes so large as a simple hydrocele. In tumors of some size the situation of the testicle may be ascertained, as in simple hydrocele, on examination of the swelling by transmitted light; by the more solid feel of the cyst at one particular part, and the peculiar pain experienced there on pressure. When the hydrocele consists of two or more cysts the tumor in the scrotum has a lobular form, but the elastic fluctuating cysts can generally be distinguished from the solid gland. The hydrocele, when large, occasions inconvenience

proportionate to its bulk. A swelling becomes apparent through the patient's dress; it is exposed to injury, and feels weighty and uncomfortable. I have observed in several cases that more pain was experienced than is usual in other forms of hydrocele, the uneasiness extending up to the loins, and not being relieved by support or the recumbent position. This may be partly due to the distension of the tunica vaginalis reflected over the epididymis, and the pressure thereby made on this part. The pain is generally relieved by puncturing the cysts. For some years a man, nearly sixty years of age, in bad health, was in the habit of coming to me about every six weeks to have acupuncture performed on an encysted hydrocele consisting of two cysts, which always became painful when it acquired a certain size and the cysts became tense. In the following case the suffering was unusually severe. W. I., a healthy man, aged forty-five, was admitted into the London Hospital in 1846, under the care of the late Mr. Andrews, in consequence of some painful swellings of the right testicle. Three cysts, about the size of walnuts, were found connected with the upper part of the gland. The patient stated that the testicle had been contused by a rope about seven years previously, and that the inflammation which followed obliged him to keep his bed for several days. The swellings formed afterwards, and he had been laid up four or five times by attacks of pain in the part extending up the cord to the loins. The cysts were tapped, and the fluid removed. The operation was followed by a little pain and inflammation in the part and a return of the swellings. Mr. Andrews then determined to incise the cysts, but the patient, when on the table, urged the removal of the gland rather than be exposed to any further suffering. Castration was accordingly performed, and he recovered favorably. The tunica vaginalis contained a small loose cartilage, and at one spot, probably where the trocar had penetrated, the two surfaces were adherent. The walls of the three cysts attached to the epididymis were so firm that when opened they did not collapse. There were also some smaller cysts connected with the part.

Diagnosis.—An encysted hydrocele of the testicle is distinguishable from simple hydrocele by the different position of the gland, which is generally found in front or at the bottom of the tumor; by the smaller size of the swelling; and by the limpid and colorless character of the fluid evacuated. As the position of the testicle is

liable to variation in ordinary hydrocele, the nature of the case cannot always be determined with accuracy until the cyst has been punctured and the character of the fluid ascertained. In a case of small encysted hydrocele, combined with rather a large varicocele, which came under my notice, the diagnosis was extremely difficult, in consequence of the dilated veins concealing the cyst, rendering fluctuation indistinct, and obscuring the transparency of the tumor. The nature of the hydrocele was rendered clear by a puncture with a needle and the escape of a few drops of milky fluid which contained spermatozoa. When also the hydrocele is multilocular, fluctuation and transparency are usually indistinct.

Treatment.—An encysted hydrocele of the testicle should not be interfered with if small and unattended with pain or inconvenience. When painful or troublesome from its large size, the tumor may be removed temporarily by acupuncture or the trocar, applied either at the back or side of the hydrocele, in order to avoid risk of wounding the testicle, the exact situation of which should first be ascertained. The relief sometimes proves permanent, as in the case of the large hydrocele mentioned at p. 154, but more generally the fluid again collects, and it becomes necessary to resort to some method of obtaining a radical cure. For many years I was in the habit of employing the seton in the mode described at p. 132. The inflammation excited by it was generally mild, and the operation successful. In one instance, however, I was annoyed by suppuration occurring in the vaginal sac; and in another case of large encysted hydrocele an abscess formed in the scrotum external to the tunica vaginalis, and caused a sinus which was tedious in healing. It must be obvious that, as the seton traverses the vaginal sac as well as the cyst of the hydrocele, there is a double risk of suppurative inflammation taking place. This circumstance, and the effects of the inflammation in the cases just mentioned, led me to try iodine injections, and the results proved so satisfactory that I have since invariably practised this method for the radical cure also of this form of hydrocele. In no instance have any ill effects attended the operation.

In dealing with hydroceles composed of two or more distinct cysts, the surgeon should bear in mind that the inflammation excited in one may extend to the others, and be sufficient for their obliteration. This does not always happen, but it is better to wait the

result of an operation on one cyst before meddling with the others. This course was adopted in the following case, which came under my care before I treated encysted hydroceles by injection. I. H., aged thirty-one, was admitted into hospital in 1846, on account of a large lobulated tumor of the left testicle, which was found to consist of three cysts of different sizes attached to the head of the epididymis. The largest cyst contained eight ounces of fluid. The two others were each about the size of a chestnut. One of these was also punctured, and spermatozoa were detected in the fluid removed from it. The spermatic cord passed in front of the tumor, and to the outer side of one of the smaller cysts. After the cysts which had been tapped had refilled, I passed a seton consisting of six silk threads through the whole length of the large cyst. The inflammation excited was mild, but as the tumor felt solid on the third day after, the seton was removed. The induration and swelling subsided slowly. A month after this operation I passed a seton of four threads through the second-sized cyst. The inflammation was so active on the following day, that the seton was removed in the evening to prevent suppuration taking place. The tenderness and swelling gradually diminished, and in a short time it became evident that both the smaller cysts were obliterated, no doubt from the extension of inflammation from the cyst operated on to the adjoining one. The patient was under treatment altogether seven weeks.

In the case related at p. 156 the surgeon intended at first to incise the cysts. This operation, which involves the laying open also the tunica vaginalis, is not to be lightly undertaken, as it is liable to be followed by severe inflammation and constitutional disturbance. Mr. Laing, surgeon, of Aberdeen, some years ago published two cases of what he termed "cystic or hydatoid disease of the testis," but which were evidently cases of encysted hydrocele, in which he was led to cut down upon and puncture the cysts. The cases were remarkable from the great number of cysts which presented themselves. The effects of the operation were severe in both instances, and in one the inflammation extended to the scrotum and produced sloughing.¹

¹ Lond. Medical Gazette, vol. xxvii, p. 456.

SECTION IV.

DIFFUSED HYDROCELE OF THE SPERMATIC CORD.

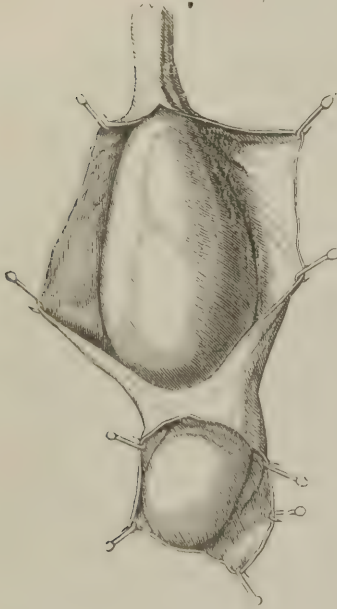
Mr. Pott has given an admirable account of this affection, under the denomination of *hydrocele of the cells of the tunica communis*.¹ It has likewise been particularly described by Scarpa.² The disease is of the nature of simple oedema, a watery fluid being diffused throughout the loose tissue connecting the vessels of the spermatic cord, and enclosed in a sheath of condensed tissue, which is invested by the musculo-aponeurotic structure of the cremaster muscle. On dissection the sheath is found distended, and when the complaint has lasted for some time, more or less thickened. The connective tissue beneath is infiltrated with a limpid albuminous serum of a white or yellowish color, which flows out in the course of the dissection. It is owing to the confinement of the fluid by the investing sheath that the swelling assumes a uniform surface, and definite shape. The cells infiltrated with serum are converted into large vesicles, some of which are big enough to admit the end of the finger. These cells are larger and more delicate towards the base of the swelling, where they sometimes disappear altogether; so that there is only one considerable cavity, the fluid having a tendency to collect towards the lowest and most depending part, and to form a fluctuating tumor there. The base of the swelling corresponds to the point at which the spermatic vessels join the testicle, and at this part a dense septum cuts off all communication with the tunica vaginalis. In some instances the effusion extends along the cord into the abdomen, as in a remarkable case related by Mr. Pott. In the figure of this affection, on page 160, taken from Scarpa, the envelope of the cremaster is laid open, exposing the pyramidal swelling enclosed in its sheath of condensed connective tissue. The testicle and tunica vaginalis are seen below it. In general anasarca the connective tissue of the spermatic cord, as well as of the

¹ Vide his Treatise on Hydrocele.

² Memoria sull' Idrocele de Cordone Spermatico. Bertrandi, an Italian surgeon, in a memoir published by the French Academy of Surgery in 1778, has given an accurate description of this affection, which, however, he did not sufficiently distinguish from the encysted hydrocele of the cord. He dissected on the dead body a diffused hydrocele which contained twenty ounces of fluid.

scrotum, is frequently distended with serum; but œdema of the

Fig. 20.



cord alone is certainly a very rare affection. Sir A. Cooper makes no allusion to it, and Mr. Pott, to whom we are indebted for so good and accurate a description of this species of hydrocele, probably met with a greater number of cases of it than have occurred in the practice of any surgeon since his day. Causes obstructing the return of blood from the testicle, as induration and enlargement of the glands in the course of the cord, would conduce to its production. I have observed a slight œdema of the cord in two or three instances after acute orchitis, but it always disappeared as the inflammation subsided. The affection is said to have been induced by the pressure of a truss applied for the cure of an inguinal hernia.

Symptoms.—Mr. Pott thus describes the appearance and symptoms of this affection: “In general, while it is of moderate size, the state of it is as follows. The scrotal bag is free from all appearance of disease; except that when the skin is not corrugated it seems rather fuller, and hangs rather lower on that side than on the other, and if suspended lightly in the palm of the hand feels heavier; the testicle with its epididymis is to be felt perfectly distinct below this fulness, neither enlarged, nor in any manner altered from its natural state: the spermatic process is considerably larger than it ought to be, and feels like a varix, or like an omental hernia, according to the different size of the tumor; it has a pyramidal kind of form, broader at the bottom than at the top: by gentle and continued pressure it seems gradually to recede or go up, but drops down again immediately upon removing the pressure, and that as freely in a supine as in an erect posture: it is attended with a very small degree of pain or uneasiness, which uneasiness is not felt in

the scrotum, where the tumefaction is, but in the loins. If the extravasation be confined to what is called the spermatic process, the opening in the tendon of the abdominal muscle is not at all dilated, and the process passing through it may be very distinctly felt; but if the cellular membrane which invests the spermatic vessels within the abdomen be affected, the tendinous aperture is enlarged, and the increased size of the distended membrane passing through it produces to the touch a sensation not very unlike that of an omental rupture.¹ At its commencement the tumor is of a cylindrical form; but at a later period, and as it increases in size, it becomes pyramidal, especially when the patient is in the erect posture. By altering his position to the recumbent the form of the tumor is slightly changed: it becomes more oblong, and nearly of equal dimensions from the ring to the testicle. However much the swelling may increase, it has been remarked that the penis never appears so much retracted as in simple hydrocele of equal size.

Diagnosis.—An omental hernia, or an encysted hydrocele of the cord, might be mistaken for a diffused hydrocele of the spermatic cord. In regard to the former, Scarpa observes, that “the diffused hydrocele of the cord, when it enters into the ring, resembles an omental hernia so closely that it is very difficult to distinguish the two complaints. Both have a cylindrical form, and extend into the ring. They are similar in consistence and degree of sensibility, as well as in the difficulty experienced in returning them. Pott represents that the omentum, when returned, remains in the abdomen until the patient assumes the erect position, or makes some effort; while the swelling in diffused hydrocele comes back immediately. I have found, however, that the omentum comes down quickly in some omental herniæ, and that the swelling, when pushed up, does not reappear immediately in some cases of diffused hydrocele. I have observed that the swelling is firmer and more irregular on the surface in the epiplocele than in the watery effusion; and that the latter is larger below than above, while these proportions are reversed in the rupture.”² Mr. Lawrence remarks, that “The distinction of the two cases must rest on the following points:—the impulse on coughing in the rupture; the complete removal of the swelling, and the sense of the omentum passing up into the abdomen; its visible

¹ Lib. cit. p. 370.

² Sull' Eemie, Mém. 1, § xxxii; quoted from Lawrence on Hernia, 5th edit. p. 251.

and tangible escape from the cavity when the rupture is brought down again by coughing, and the free natural condition of the cord and ring when the swelling has been replaced. The fluctuation of the watery tumor at its lower part; the absence of impulse in coughing; its imperfect removal under pressure, so that the cord can never be felt in a natural state; and sometimes a visible enlargement of the inguinal canal and its neighborhood when the fluid is pressed upwards."¹ An irreducible epiplocele would be even more liable to be mistaken for a diffused hydrocele, as some of these distinguishing marks would be absent. In cases of much difficulty and doubt, the surgeon must be guarded in pronouncing an opinion, and very cautious in performing any operation. Scarpa, indeed, frankly confesses the imperfection of our art with respect to the diagnosis in these cases.²

Diffused hydrocele is distinguished from encysted hydrocele of the cord by the pyramidal and somewhat diffused form of the swelling, which extends to the ring; by the alteration in shape producible by pressure; and by the absence of fluctuation in its upper part.

As the testicle is perceptible in diffused hydrocele of the cord, this disease cannot well be mistaken for simple hydrocele. Nor is diffused hydrocele likely to be confounded with varicocele, the characteristic symptoms of the latter being too evident to allow of the intelligent surgeon erring in his diagnosis of these affections.

Treatment.—In regard to the treatment of diffused hydrocele of the cord, Mr. Pott observes, "While it is small it is hardly an object of surgery, the pain or inconvenience which it produces being so little that few people would choose to submit to an operation to get rid of it, and it is very seldom radically curable without one; but when it is large, or affects the membrane within the cavity as well as without, it becomes an apparent deformity, is very inconvenient both from its size and weight; and the only method of cure which it admits is far from being void of hazard; as must appear to every one who will consider, or who is at all acquainted either with the nature of lymphatic extravasation or absorption, or with the frequent consequences of wounds inflicted on parts merely membranous."³ This form of hydrocele admits of temporary if not permanent relief, with less risk than was supposed by Mr. Pott. For, as the cells communicate freely, it is not necessary to make a large

¹ Lib. cit. p. 252. ² Treatise on Hernia, tr. by Wishart, p. 99. ³ Lib. cit. p. 371.

incision for the removal of the fluid, one or two acupunctures in the depending part of the tumor being sufficient to enable the fluid to escape into the connective tissue of the scrotum, from which it will soon be removed by absorption. The danger of free incisions into the distended connective tissue arises from their being liable to excite diffused inflammation, which is apt to spread along the cord to the pelvis, and end in gangrene, especially in persons of impaired constitution. Both Scarpa and Pott have witnessed instances in which the operation of incision has proved fatal. The latter surgeon has related a remarkable case of diffused hydrocele, in a man, aged thirty-five, of such prodigious size that it hung more than half-way down to the patient's knee, and formed a considerable tumor in the inguinal region. The diagnosis was extremely difficult. An incision was made into it, and eleven Winchester pints of water were drained off. The fluid collected again; and Mr. Pott divided the whole scrotum from the bottom upwards, from which operation the patient died.¹

SECTION V.

ENCYSTED HYDROCELE OF THE SPERMATIC CORD.

This term is applied to a tumor caused by the development of a cyst containing fluid, in the loose connective tissue of the spermatic cord. The cyst is formed of a thin transparent membrane, possessing the ordinary characters of a serous membrane, and contains generally a limpid aqueous liquid, having little or no albumen, but sometimes a straw-colored serum similar to the fluid of simple hydrocele. It is of an oval form, and its size, though variable, seldom exceeds that of a hen's egg, and is usually smaller. It is loosely attached to the vessels of the cord, which are situated at its back part, but become separated and displaced by it. The cyst is invested by the common integuments, superficial fascia, musculo-aponeurotic sheath of the cremaster muscle, and fascia transversalis. It may occur either immediately above the testicle, in the middle of the cord, or just below the abdominal ring, and even within the inguinal canal. Usually there is a single cyst, but occasionally several are developed, and a chain of them has been formed along the cord. The cyst and its contents are liable to changes consequent upon inflammation.

¹ Lib. cit. Case X, p. 377.

Encysted hydrocele of the cord appears to originate in a partial or imperfect obliteration of the prolongation of peritoneum, formed at the period of the transition of the testicle. Thus, in consequence of the serous membrane remaining unclosed at one or more spots, an isolated sac or sacs are left in the course of the spermatic cord. A cyst of this kind when distended with serum constitutes an encysted hydrocele. Such is obviously the mode of origin of this affection when occurring in infants, and no doubt in adults it generally originates in the same way. M. J. Cloquet has remarked that the remains of the peritoneal process accompanying the testicles in their descent were met with in male subjects of all ages, and he mentions as a singular circumstance that they were nearly as frequently found in the old as in the young subjects.¹ My own dissections

Fig. 21.



agree with the observations of this accurate anatomist. In the London College Hospital there is a preparation showing the tunica vaginalis continued for about two inches up the cord, and, immediately above it, an encysted hydrocele, which was taken from an adult subject. In dissecting the body of a man, aged eighteen, I found an encysted hydrocele of the cord above the testicle in close contact with the tunica vaginalis. Immediately above this cyst, but quite distinct from it, there was a narrow and empty serous sac three inches in length, with a contracted neck, and communicating with the abdomen. They are figured in the accompanying engraving, with the hernial sac laid open, and part of the parietes of the encysted hydrocele cut away to expose their interiors. The position of the testicle is so changed that

its anterior border is directed downwards.—In the examination of the body of a man who died of disease of the heart, I found on the right side a thickened and empty serous pouch, extending for about

¹ Description of the parts concerned in Inguinal and Femoral Hernia, tr. by McWhinnie, p. 25.

an inch and a half below the external abdominal ring. Directly below it was an independent cyst, capable of containing a walnut, similar in structure to the hernial sac, but lined by a thin false membrane. The tunica vaginalis, which was healthy in structure, extended up the cord as far as the cyst, from which it was separated by a thick and firm partition.—In opening the body of a sailor who died with ascites, I noticed at the internal ring a small, delicate, transparent, pedunculated cyst, not larger than a nut, projecting into the cavity of the abdomen. In the spermatic cord there was a large serous cyst, which extended into the inguinal canal, and contained a small quantity of transparent fluid. A small orifice at its upper part opened into the pedunculated cyst, which proved to be a process from the cyst in the cord. In Fig. 24 I have given a representation of an inguinal hernia, combined with an elongated encysted hydrocele of the cord; and in Fig. 27 a representation of an encysted hæmatocoele of the cord, in which the tunica vaginalis remained unobliterated as far up as the cyst, whilst a hernial sac is situated immediately above it. These dissections confirm the view taken by Sir A. Cooper, and now commonly adopted, of the mode of origin of encysted hydrocele of the spermatic cord in the adult.

Symptoms.—An encysted hydrocele of the spermatic cord is seldom discovered until it has attained some considerable size, its formation being imperceptible, and unattended with pain or inconvenience. It produces a swelling in the spermatic cord, which is of an oval and defined form, and distinct from the testicle, which feels even and tense, and has an obscure fluctuation, and may be handled freely without pain, and which is more or less transparent, and quite movable upwards and downwards. The distance of the tumor from the abdominal ring and testicle varies in different cases, and is liable also to temporary alterations from the irregular contractions of the cremaster muscle. The vessels forming the spermatic cord can generally be traced to the posterior part of the cyst. This affection is met with most commonly in infants, and I have seen it as early as a fortnight after birth; but it occurs at all periods of life.

Diagnosis.—An encysted hydrocele of the spermatic cord can scarcely be mistaken for a vaginal hydrocele, but sometimes cannot be distinguished without difficulty from an encysted hydrocele of the testicle. Indeed I know that cases which have been described as hydroceles of the cord, the fluid containing spermatozoa, have been

in reality encysted hydroceles springing from the epididymis. When the cyst in the cord is situated high up, the distinction is clear; but when it is close to the gland and of large size, so that the testicle is more or less embedded in the tumor, this form of hydrocele is very readily mistaken for an encysted hydrocele of the testicle, nor is the diagnosis always possible. The chief distinctive mark is the circumstance that notwithstanding its apparent close connection with the gland, the cyst may be detached by manipulation, and proved to be formed above and distinct from the testicle or epididymis; whereas when an encysted hydrocele of the epididymis is pushed towards the ring, the testicle closely follows or moves with it.

An encysted hydrocele of the cord is liable to be mistaken for an inguinal hernia. It differs, however, in the uniform size and defined shape of the tumor, which does not extend upwards to the ring; in being transparent, very movable, and receiving no impulse on coughing; and in the absence of the gurgling sensation, and other symptoms usually attendant on ruptures. When of small size, and situated near the abdominal ring, the tumor may admit of being pushed upwards into the inguinal canal, a circumstance which renders the diagnosis rather difficult. The facility, however, with which the vessels of the cord can generally be felt when the tumor has descended again, and the parts between the swelling and the ring are grasped between the finger and thumb, will enable the surgeon to ascertain the nature of the case. But if, as sometimes happens, the cyst be situated within the inguinal canal, or at the opening of the external abdominal ring, it is extremely difficult to distinguish the swelling from a hernia; for it disappears under pressure, is very apparent when the patient is in the erect position, and is removed or is less manifest when he is in the recumbent posture. The diagnosis will be facilitated by observing that although the tumor cannot be made to descend below the external ring, neither can it be thrust completely into the abdomen like a portion of intestine. The cyst being lodged in the inguinal canal, there must still be a tumor in the groin behind the tendon of the external oblique muscle, which, though somewhat obscure, will yet be perceptible to the eye and fingers of the adroit surgeon. The following is a rare case of *acute* hydrocele of the cord, in which difficulty was experienced in the diagnosis.—A youth, aged fifteen, was

admitted into hospital on account of a supposed strangulated hernia. When three years of age he had been subject to rupture on the right side, and had worn a truss for two years, when it was discontinued, as the hernia seemed cured. On the morning of his admission he was seized whilst at work with pain in the right groin, and on feeling the part discovered a small swelling. As the pain was increasing, he returned home, and shortly afterwards vomited. A surgeon who was sent for applied the taxis, and failing to reduce what he supposed from the history and examination to be a hernia, sent the lad to the hospital, when he was again examined, and placed in a warm bath, after which I was summoned to perform an operation. I found the lad with an anxious countenance, and affected with nausea. Just below the abdominal ring there was an extremely tense and tender oval swelling the size of a pullet's egg. It had a contracted neck extending into the inguinal canal, received no impulse on coughing, and the testicle was below and distinct from it. On examination by transmitted light the swelling was found to be quite transparent. I at once came to the conclusion that the case was an acute hydrocele of the spermatic cord, and by the application of leeches and ice to the tumor, and the administration of calomel and opium, all the symptoms were relieved. He was discharged in a few days, at which time the fluid had nearly disappeared. Above the swelling there was a slight hernial descent, for which a truss was ordered.

Treatment.—In children encysted hydrocele of the cord, like simple vaginal hydrocele, often and indeed generally disappears spontaneously, so that surgical interference is seldom required for its removal. It is frequently, however, a source of uneasiness to parents, who are apt to apprehend the existence of a rupture. The surgeon may therefore safely assure them, not only that it is a complaint of slight importance, but that if it does not vanish of its own accord, or by simple treatment, an operation comparatively trifling will effectually remove it whenever it attains such a size as to be productive of inconvenience. But it is better not to interfere with an encysted hydrocele of the cord, either in children or adults, so long as it is of small size and unattended with pain.

The compound tincture of iodine may be painted over the swelling every second or third day. Should it not disperse under this treatment in the course of two or three weeks, and continue to be

a source of annoyance from its bulk, acupuncture may be performed. In early life this generally proves a permanent remedy. But if the swelling return, as may be expected in the adult, other measures must be resorted to.

The radical cure of encysted hydrocele of the spermatic cord may be effected in various ways. Excision of a portion of the cyst, incision, the seton, the tent, and injection, have all been employed for the purpose. Incision and the seton are not free from risk, being liable to excite diffuse inflammation of the connective tissue of the part. Mr. Pott has related a case treated by incision which proved fatal on the seventh day, from inflammation extending to the connective tissue of the pelvis and loins. The subject of the operation was, however, in a bad state of health.¹ I was informed by the late Mr. Morton of a case in which such severe inflammation of the connective tissue succeeded the introduction of a seton, composed of a single thread of silk, through an encysted hydrocele in the spermatic cord of a boy, that suppuration took place in the iliac fossa, and for a time endangered the patient's life, though he finally recovered.

The injection of the tincture of iodine is quite applicable to this form of hydrocele, and is the treatment which I recommend as both safe and effectual.

SECTION VI.

COMPLICATIONS OF HYDROCELE.

The following are the principal complications of hydrocele:—

1. Vaginal hydrocele, combined with encysted hydrocele of the testicle.

2. Vaginal hydrocele, combined with encysted hydrocele of the spermatic cord.

3. Vaginal hydrocele, combined with diffused hydrocele of the spermatic cord.

4. Oscheo-hydrocele, including both vaginal hydrocele, and encysted hydrocele of the cord, combined separately with inguinal hernia.

1. *Vaginal hydrocele, combined with encysted hydrocele of the testicle*, is not an uncommon complication. In dissections I have

¹ Lib. cit. Case XIV, p. 390.

often found the tunica vaginalis distended with three or four drachms, and even an ounce or two of serum, two or more small distinct cysts being at the same time connected with the upper part of the epididymis; and I have twice met with this complication on both sides in the same individual. The small adventitious cysts appear to be the original disease, the irritation produced by them being the cause of the effusion in the tunica vaginalis. The tumor formed by the combined cysts is in some cases smooth, and in others irregular, according to their relative size. When the quantity of fluid effused in the tunica vaginalis is only small, this complication may sometimes be distinguished; but when the amount is considerable, the distension of the tunica vaginalis completely masks the cysts developed in the testicle or epididymis, rendering it impossible for the surgeon to detect the nature of the case until after the withdrawal of the fluid from the vaginal sac. The combined hydroceles sometimes attain so great a size as to require tapping; and some of the cases of operation on multilocular hydrocele mentioned by writers I believe to have been instances of this complication. It sometimes happens in a case of this kind, that when the trocar is introduced at the anterior part of the swelling a quantity of pale straw-colored serum is drawn off; but the tumor, though diminished, is not removed. If, however, the trocar be afterwards passed into the fluctuating swelling which still remains, exit is given to a limpid or opaque white fluid.—A man, aged fifty-four, consulted me on account of a hydrocele. I removed four ounces of yellow serum from the sac of the tunica vaginalis, and then detected a cyst attached to the epididymis. This I tapped with a fine trocar, and drew off two drachms of opaque fluid, which contained spermatozoa. There was no return of either hydrocele at the end of two months. The only after-treatment adopted was suspension and the outward application of the tincture of iodine. It is fair to infer that by the non-return of the encysted hydrocele, the irritation which produced the vaginal hydrocele was removed. The facility of diagnosis and cure in this instance may be contrasted with the difficulties encountered in the following case, for which I am indebted to Mr. Hamilton, surgeon to the Richmond Hospital, Dublin.—Mr. B., a fair young man, aged twenty, consulted Mr. Hamilton about a hydrocele of moderate size on the left side. It had existed for two years, and had been acupunctured and repeatedly tapped, and its radical

cure had been attempted by iodine injection and also by seton, but without any effect on the hydrocele. The testicle was declared to be diseased, and he had been salivated, but with no diminution of the swelling. Mr. H. drew off about half a pint of clear pale yellow fluid, and then observed that the testicle was enlarged, very irregular and nodulated, the lower part of the epididymis being prolonged considerably downwards. The patient being of a strumous constitution and family, two of his brothers having died of phthisis at the age of puberty, the case was regarded as one of scrofulous disease of the testicle with extensive deposit in the epididymis. Castration was advised and performed, and the patient recovered favorably. When I was in Dublin, last summer, the tumor was shown me by Mr. Hamilton. The tunica vaginalis was thickened, but free from adhesions. The testicle was healthy, and displaced to one side by a moderate-sized multilocular hydrocele of the epididymis. There was also a small distinct cyst between the tunica vaginalis reflexa and tunica albuginea. The above case is one of remarkable interest and practical value. The strumous habit of the patient, the irregular tumor of the epididymis, and the resistance of the hydrocele to active treatment, indicated serious disease of the organ, and led to its being excised. In a similar case, the examination of the tumor by transmitted light in a dark room would probably enable the surgeon to detect the nature of the disease; yet not without difficulty, especially if, as in the case just narrated, the tunica vaginalis were thickened, and the encysted hydrocele multilocular.

The following case occurred to my colleague, Mr. Adams. As in the one just related, the failure of the radical treatment of the vaginal hydrocele appears to have been owing to the complication with encysted hydrocele.—A man, aged twenty-two, was admitted into the London Hospital, in February, 1855, with a hydrocele, which had formed after a contusion of the right testicle. It had already been tapped five or six times. Mr. Adams injected the tunica vaginalis with tincture of iodine without success. Three months afterwards he laid open the thickened sac, and then perceived three transparent cysts about the size of hazel-nuts connected with the epididymis. These cysts were also incised. A good deal of inflammation and swelling of the parts followed the operation. This subsided, and the wound closed by granulation in three weeks.

2. *Vaginal hydrocele, combined with encysted hydrocele of the spermatic cord*, is somewhat rare. The swelling produced by the accumulation in the tunica vaginalis is below and rather in front of the tumor in the spermatic cord, and a well-defined furrow in the scrotum generally marks the boundary between the two. In the London Hospital College there are two specimens of a collection of fluid in the tunica vaginalis associated with an encysted hydrocele of the spermatic cord. In one of them, the tunica vaginalis has remained unobliterated for about two inches along the spermatic cord, and the encysted hydrocele is seen immediately above it. In the other preparation, it is apparent that both sacs have been the seat of inflammation, false membranes being contained within them, and the testicle being a good deal enlarged.—A child, six years of age, came under my care at the hospital on account of a large hydrocele on the right side, which extended upwards nearly as high as the abdominal ring. Three acupunctures were made in the tumor, and in ten days the whole of the fluid had disappeared; but observing a small swelling still remaining in the direction of the spermatic cord, I made a further examination, and detected an encysted hydrocele of the cord just above the testicle, which had previously been concealed by the fluid collected in the vaginal sac. The skin covering it was painted with tincture of iodine twice a week; but not disappearing so quickly as I wished, it was afterwards punctured with a needle. The acupuncture was repeated two or three times, and in a fortnight the encysted hydrocele of the cord was removed, and I believe did not return. A case of this complication, in an infant not many weeks old, is recorded in the Medical Gazette.¹

3. *Vaginal hydrocele, associated with diffused hydrocele of the cord*, is also a rare complication. The chief marks of the complaint are, the remarkable volume of the neck of the tumor, with a dilated state of the abdominal ring; the irregular form of the swelling; and the existence of a furrow passing obliquely on the anterior part of the scrotum, corresponding to the superior margin of the distended vaginal coat, and being higher or lower according to the amount of the fluid accumulated within it. Simple hydrocele of the hour-glass form exhibits a double tumor divided by a furrow; but the swelling is defined above, and has no neck, and fluctuation

¹ Vol. xxix. p. 757.

is communicable from one to the other. Any doubt in regard to diagnosis in a case of this kind may be cleared up by a puncture

Fig. 22.



Simple hydrocele combined with diffused hydrocele of the cord. (After Scarpa.) 1—1. Furrow marking the division between the tumors.

made into the anterior tumor, when, after the water collected in the tunica vaginalis has escaped, the swelling occasioned by the diffused hydrocele of the cord will still remain undiminished.

Encysted hydrocele, combined with simple hydrocele, is also distinguished from the present complication by the defined form of the tumor above; and from a vaginal hydrocele of the hour-glass form, by fluctuation being limited to the separate swellings.

4. *Oscheo-hydrocele*.—Scrotal hernia may be combined with vaginal hydrocele, each disease being marked by its peculiar symptoms. A voluminous hydrocele, if unsupported, appears to be highly favorable to the occurrence of hernia and the extension of the sac, by dragging down the peritoneum. M. J. Cloquet dissected the body of an old man, the subject of inguinal hernia on the right side. The sac was four inches in length; its orifice was large and rounded, and its cavity was separated into two parts by a fibrous projecting ring. Below the latter the peritoneum was thick, whitish, and very adherent to the external coverings; above, it was thin and transparent, as in the abdomen. The descent of the fibrous ring, and consequently the elongation of the sac, appeared to be owing to the weight of a voluminous hydrocele of the tunica vaginalis, which intimately adhered to the lower part of the hernial tumor. A fold of small intestine, two inches and a half long, and unadherent, occupied the upper division of the sac. M. Cloquet has related the particulars of another case of inguinal hernia, complicated with a very large hydrocele, in which he observed, on raising the tumor and gently drawing up the peritoneum of the abdomen, that the hernial sac receded and diminished in extent. The sac contained omentum, which was reducible, and the hernia was situated behind

the hydrocele.¹ The occurrence of these two diseases is not an uncommon complication; in most of the cases which I have met with the hydrocele was placed below, and free of the rupture, and in a few only in front of it. I have never found the hernial sac covering the forepart of a hydrocele. The ordinary relations of hydrocele and scrotal hernia may be seen in the accompanying woodcut. In Fig. 11 the sac of an inguinal hernia is represented at some little distance, above a small hydrocele. Dupuytren states, that when a hydrocele is placed in front of a hernia, a part of the omentum or intestine descends into a cyst, which projects into the hydrocele, and is formed of the hernial sac and serous fold of the tunic of the testicle. Out of six cases of this kind which came under his observation, in two instances he found symptoms of strangulation to depend on constriction at the part where the viscera were engaged in the serous pouch of testicle.²

Fig. 23.



This complication is of the nature of the *hernia infantilis*, described by Mr. Hey, and called by Sir A. Cooper *encysted hernia of the tunica vaginalis*.

When the hydrocele is large and the hernia irreducible, the diagnosis of these cases is sometimes difficult, in consequence of the hernial tumor pressing on the upper part of the sac of the hydrocele, and conveying an impulse on coughing to the whole body of the fluid contained in the latter. The nature of the case may be ascertained on examination of the tumor by transmitted light.

The coexistence of hernia and hydrocele does not in general constitute an objection to the performance of the radical operation for the latter. But the surgeon should be particularly cautious not to excite too much inflammation; and in cases where the contiguity of the two sacs is close and extensive, and in those in which the hernial sac projects into the hydrocele, he should recommend the patient to be content with the palliative treatment. The hernia should always, if possible, be reduced before the tunica vaginalis is punctured. A large pyramidal hydrocele reaching to the ring not only

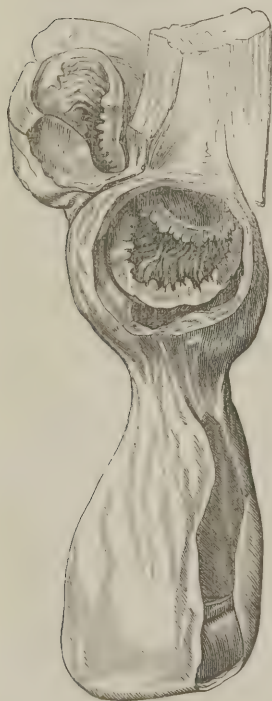
¹ Recherches Pathologiques sur les Causes et l'Anatomie des Hernies Abdominales, p. 22.

² Leçons Orales, Brussels edit. t. iv. p. 273.

interferes with the application of a truss, but may render one unnecessary by closing the opening and effectually preventing the descent of the bowel. In a case of the kind, in which I removed by tapping thirty ounces of fluid, a large hernial protrusion occurred as the hydrocele subsided during the operation.

Scarpa has described a case of strangulated inguinal hernia, complicated with encysted hydrocele of the spermatic cord, in which it was necessary to operate.—A student, about twenty-nine years of age, was attacked with symptoms of incarcerated hernia. He had been subject to a rupture on the left side of the scrotum for more than fifteen years, but had not been able to fit a proper bandage.

Fig. 24.



The hernia was tense, and above the moderate size, and the bottom of the tumor was unusually raised, and as it were pushed upwards, by a body situated behind the hernia; which body was undoubtedly not the testicle, as the gland was felt in the bottom of the scrotum, and lower down than the hernia. The symptoms being very urgent, the patient was operated on in Scarpa's presence. The hernial sac was found to contain a very small quantity of water; and a loop of small intestine lightly tinged of a brown color, and about three or four inches in length. After division of the neck of the sac and the ring, and also after reduction of the intestine, there still remained externally a soft tumor, elastic, and evidently full of fluid. An incision was made into this tumor, and a considerable quantity of serous fluid discharged. At the bottom there appeared a vesicular gelatinous substance, which was cut

away; and it was clearly perceived that the intestinal scrotal hernia was accompanied posteriorly with an encysted hydrocele of the spermatic cord. In the course of six weeks the patient was completely cured of both these diseases.¹ This is a somewhat rare complica-

¹ Treatise on Hernia, tr. by Wishart, p. 231.

tion, and I have met with but few instances of it. In all it occurred on the right side, and the patients were adults. In one, who died of peritoneal inflammation, with the hernia unreduced, I made a dissection of the parts. The hernial sac was greatly thickened, and coated with lymph, and contained a small fold of intestine surrounded by turbid serum. Directly below it there was a hydrocele of the cord of an oblong shape, and more than two inches in length, the parietes of which differed from the hernial sac in being thin and transparent. The testicle hung lower than natural, and was so displaced that its antero-inferior edge presented directly downwards (see Fig. 24). In another case the patient was a young man, twenty years of age, and the hydrocele and hernia were both recent, and had formed about the same time.

In encysted hydrocele of the spermatic cord the parts are generally in a condition favorable to a hernial descent, the cyst being most commonly the result of an indisposition of the peritoneum in the course of the cord to unite, or become obliterated after the arrival of the testicle in the scrotum; and it often happens in these cases that the peritoneal process above the hydrocele remains patent, and in communication with the cavity of the abdomen. Thus at p. 164, I have narrated two cases of encysted hydrocele of the cord, in which, on dissection, I found an empty hernial sac above the cyst of the hydrocele. If the hydrocele extended high up, it would prevent the proper adjustment of a truss, and would therefore require to be cured before the application of any instrument. This was the case with a middle-aged man sent me for examination by the late Mr. Avery. The hydrocele was on the right side, and being only a short distance below the external ring, interfered with the application of a truss, on which account I recommended it, though small in size and not otherwise inconvenient, being injected.

SECTION VII.

HYDROCELE OF THE HERNIAL SAC.

A hernial sac sometimes becomes the seat of dropsical effusion, the connection with the abdomen being interrupted by adhesion at the neck, or by a portion of adherent intestine or omentum blocking up the orifice. Thus the continued application of a truss some-

times causes obliteration of the neck of the sac, and the radical cure of the hernia; but the lower part, remaining patent, is liable to become the seat of an effusion of serum. A man was admitted into the hospital of La Charité in Paris, under Boyer, with a tumor in the right groin, which was found to be hydrocele of an old hernial sac. The hernia had been cured by the obliteration of the neck of the sac, and the serous pouch had remained for a time wrinkled up in the course of the cord, but it afterwards became the seat of dropsical effusion.¹ Mr. Pott has narrated two interesting cases of a collection of fluid in the sac of a congenital hernia.² In one the opening of the sac was closed by adherent omentum; in the other it was blocked up by intestine.

Pelletan has recorded two cases of hydrocele of the hernial sac (one of them congenital), in which the communication with the abdomen was closed by adherent omentum.³ Hydrocele of the hernial sac is certainly a rare affection, and I have witnessed only a few cases of it. In one which occurred some years ago at the London Hospital, the hydrocele was double; the tumors were very large on each side, quite unconnected with the testicles, and resulted from the constant wearing of a double truss for a period of thirty-five years. Le Dran has recorded a remarkable case of triple hydrocele on the same side, a hydrocele of a hernial sac having been combined with a hydrocele of the cord and with a simple hydrocele, which together formed a tumor the size of a small melon. The hydrocele of the hernial sac was consequent upon the radical cure of a hernia, the obliteration of the neck of the sac having been caused by the pressure of a truss.⁴

Diagnosis.—In hydrocele of the hernial sac, the absence of a defined margin at the upper part of the tumor, together with the swelling at the abdominal ring, and the inability of feeling the spermatic cord, being also marks of scrotal hernia, tend to render the diagnosis of this rare form of hydrocele somewhat obscure. But the detection of fluid by the transparency and evident fluctuation of the tumor, and a careful attention to the history of the case, are sufficient to enable the practitioner to avoid any serious

¹ *La Lancette Française*, Février, 1837.

² *Lib. cit.* p. 463, Cases XXXIV and XXXV.

³ *Clinique Chirurgicale*, tom. iii, pp. 22, 108.

⁴ *Observations on Surgery*, tr., Case LXXV, p. 260.

error. There is generally, also, an absence of any impulse on coughing; though sometimes, in consequence of the swelling extending up into the inguinal canal, an impulse is communicated to it from the abdomen, which increases the difficulty of the diagnosis. The extension of the swelling to the abdominal ring, and the testicle being distinct from the tumor at the bottom of the scrotum, are sufficient to distinguish hydrocele of the hernial sac from simple hydrocele. Some difficulty might be experienced in diagnosing a small hydrocele of the hernial sac from an encysted hydrocele of the cord high up. They are both distinct from the testicle, and their relative situation and even mode of formation are very similar; the only essential difference being that the process of peritoneum constituting the former had once contained either intestine or omentum. A hydrocele of the hernial sac occurs somewhat late in life, is usually of some considerable size, and its fluid contents are of an amber or dark color; whilst an encysted hydrocele of the cord generally appears before puberty, is rather small in size, and contains fluid which is generally colorless and nearly free from albumen. Attention, therefore, to these circumstances, but more especially to the history of the case, would leave but little room for doubt.

The following case will illustrate the difficulties of the diagnosis. J. B., a shoemaker, aged fifty-eight, came under my care at the London Hospital, March 25, 1843, on account of a painful swelling in the left groin. There was a tense tumor, the size of a hen's egg, just below the external abdominal ring, and about two inches above the testicle, from which it was quite separate. It received no impulse on the patient coughing, fluctuated indistinctly, and was very tender when handled. The spermatic cord could be traced from the testicle to the back part of the swelling. The tumor was defined below, but extended by a broad neck into the inguinal canal. The patient was placed in a dark room, and the swelling examined by transmitted light, and found to be transparent, but its want of prominence and small size rendered this mode of examination very difficult. He stated that the swelling first came about two years ago, after a blow in the groin, which he received by running against a post. It came gradually in the course of a month after the accident, and has never since disappeared. He was seized three days before he came to the hospital with vomiting, and pain which ex-

tended from the tumor into the abdomen, and pain was still felt on pressure in the vicinity of the abdominal ring. He had experienced a similar attack about nine months previously. I concluded that this was a case of hydrocele of the hernial sac, a piece of intestine or omentum being adherent at the ring and slightly inflamed. The pain just above the tumor, and the diffused character of its upper part, induced me to suppose that it was not an encysted hydrocele of the cord. Eight leeches were applied to the upper part of the swelling, and afterwards a cold lotion; a dose of castor oil was given, and the patient kept at rest in bed. 28th. The swelling was less in size and not so tender, and he was relieved of the pain in the abdomen. Five more leeches were applied, and the lotion continued. April 3d. The swelling was further diminished, and all tenderness removed. I ordered a blister over the part. From this time the tumor continued steadily to decrease, and on the 17th all the fluid had disappeared. On placing the hand on the groin a distinct impulse, arising from a slight protrusion, was felt when the patient coughed. A truss was applied. This restrained the protrusion, and the patient was discharged cured without the slightest swelling remaining in the course of the spermatic cord.

Treatment.—Cases of hydrocele of the hernial sac arising after the radical cure of a rupture, the neck of the sac being permanently obliterated by adhesion, should be treated on the same principles and in the same manner as simple hydrocele. In the treatment of cases where there is reason to believe that the opening of communication has become closed by the adhesion of a portion of omentum or intestine, more care is required, and the surgeon should be content with palliative means. Some years ago I saw a case of hydrocele of the hernial sac through which a seton had been passed for the radical cure, but with a fatal result. The neck of the sac was found after death closed by adherent omentum, which was highly inflamed, marks of peritonitis existing in its vicinity.

Spurious Hydrocele of the Hernial Sac.—Cases of a chronic collection of fluid in the sac of an old hernia, in which the communication with the abdomen has been permanently obliterated by adhesion at the neck, either of the sides of the sac, or of a portion of omentum or intestine, must not be confounded with cases of

scrotal hernia attended with a remarkable effusion of fluid. The latter affection may be denominated *spurious hydrocele of the hernial sac*, a term that would include all cases of hernial sac coupled with serous effusion, whether the communication with the peritoneal cavity be closed or open, and the fluid reducible into the abdomen. The second case, related by Mr. Pott, to which I have alluded, seems to have been an example of this kind. Symptoms of strangulation ensued in a man, aged twenty-two, who had been subject to rupture. Mr. Pott divided the integuments of a large scrotal swelling as in the operation for hernia, and on opening the sac let out about half a pint of clear limpid water, upon the discharge of which the whole tumor of the scrotum subsided, and it was supposed that he had mistaken a hydrocele for a hernia. But the tumor and hardness about the abdominal ring still remained unaltered, and on passing the finger upwards a small portion of intestine was found engaged in the abdominal ring, and bound extremely tight. The stricture was divided; but the gut could not be returned, until an adhesion which connected it to the lower border of the opening was discovered and also divided. The patient recovered. Scarpa well remarks, "Whatever difficulty these complications may oppose to the exact diagnosis of reducible intestinal scrotal hernia, they do not occasion any with regard to the operation, whenever the hernia is affected with strangulation; as the symptoms accompanying the incarceration of the intestine show clearly the nature of the principal disease, and render the operation necessary, by means of which we have at the same time the advantage of laying bare what formed the complication of the hernia, and of curing radically both diseases."¹ He has related an example of acute hydrocele of the hernial sac, complicated with intestinal scrotal hernia, which illustrates the difficulty of the diagnosis also in these cases. A man, twenty-five years of age, stout and very fat, was affected with incarcerated scrotal hernia of enormous size. The hernia was of eight years' standing. The day before the incarceration, he was obliged to make a rapid journey on horseback, his truss broke on the way, and on alighting he found the scrotum of extraordinary size; he was likewise affected with nausea, acute pain in the groin, and inclination to vomit. The tumor was fully sixteen inches in circumference, and almost entirely concealed the penis; it was broad

¹ Treatise on Hernia, tr. by Wishart, p. 230.

at the bottom, narrow at the upper part towards the ring, equal and smooth in almost its whole surface, and elastic. It resembled a large hydrocele, and might have been taken for one, if there had not been evident marks of incarcerated intestine. Scarpa remarks, "I could with difficulty persuade myself that this large tumor was formed for the most part by water collected in the vaginal coat of the testicle, or in the hernial sac, as the patient never had the smallest mark of serous effusion in the scrotum, as well as because, from the repeated assertion of the patient, the hernia in the course of eight years had never exceeded the size of a hen's egg, and there was no reason to suppose that so much water had descended from the cavity of the abdomen into the scrotum in a young man in other respects very healthy and strong. I rather suspected, considering the fatness of the patient, that by the exertion of the riding a great mass of omentum had descended, although there still remained some doubt how, in so short a time, the hernial sac could have yielded to so great a distension, and because the tumor had rather the appearance and elasticity of a large hydrocele than of a large hernia composed of intestine and omentum." There was no doubt as to the impossibility of reducing the parts without an operation, as the symptoms of strangulation increased in violence every minute. On the first cut into the hernial sac, about three pounds of yellowish serum were discharged. It was a common scrotal hernia. At the upper part of the sac there was a loop of small intestine about two inches long, but no omentum. The stricture was divided, and the intestine returned. The patient recovered, the wound having healed in seven weeks. A somewhat similar case of large strangulated scrotal hernia, in which the bulk of the tumor was formed by serous effusion, is recorded by Mr. Shaw, of the Middlesex Hospital.¹ Nothing is more common than the presence of fluid in the sac of a strangulated hernia, though it rarely exists, as in these cases, in such abundance as to cause any difficulty in the diagnosis. I have met with three cases of strangulated scrotal hernia, in which several ounces of fluid were contained in the same sac with the protruded viscera, and in which the rupture being congenital no testicle could be distinguished; but the previous history, fulness at the abdominal ring, and well-marked symptoms of strangulation, were sufficient to indicate the true nature of the complaint. In one of these cases,

¹ Lond. Med. and Phys. Journal, vol. lvi, p. 18.

which was operated on by Mr. Hamilton, the stricture was divided external to the sac; and the fluid which had concealed the intestine, adherent omentum, and testicle, remained after the operation, but became absorbed as the patient recovered. Had Scarpa, in the case related above, examined the tumor by transmitted light, he could scarcely have suspected that the bulk of the swelling consisted of omentum. In those cases of spurious hydrocele of the hernial sac in which the fluid and intestine or omentum are reducible, the complication may be made out by returning the contents of the sac into the abdomen, the patient being in the horizontal posture; when by pressing the finger gently on the abdominal ring, and allowing the patient to rise, the fluid will slip down into the scrotum, and produce a transparent tumor or hydrocele. On entirely remitting the pressure, the intestine or omentum will be felt descending into its former situation. In the following case, which was shown me by Mr. Adams, the symptoms produced by spurious hydrocele of the sac of a congenital hernia closely resembled those of a congenital hydrocele.—A lad, aged twelve, applied as an out-patient at the London Hospital, on account of a swelling which occupied the left side of the scrotum. It was a transparent tumor, of an oval form, reaching upwards into the abdominal canal, which fluctuated, completely filled the scrotum, and received an impulse on coughing. The left testicle was imperceptible. On making gentle pressure the swelling disappeared *rather suddenly*, and then the testicle could be readily distinguished, and was found less than half the size of the gland on the right side. The sac which contained the fluid felt a good deal thickened. The boy stated that the swelling had existed since he was two years of age. This appeared to be a case of congenital hydrocele, of which, indeed, it presented all the usual symptoms, except that on pressure the swelling disappeared suddenly instead of gradually. The boy was accordingly directed to have a truss to press on the abdominal ring. After it had been worn for three weeks, the fluid was found to have entirely disappeared from the sac, and none descended on the removal of the truss. When, however, the boy coughed, a small intestinal hernia came down. It then became clear that this had been a case of spurious hydrocele of the hernial sac; and thus was explained the only symptom unusual in congenital hydrocele, viz. the sudden disappearance of the tumor on pressure, the fluid passing into the

abdomen together with the intestine, which it had completely masked from observation.

M. J. Cloquet has detailed the particulars of the dissection of the parts, in a case of congenital inguinal hernia on the right side, found in the body of a man, aged thirty, affected with ascites, who had worn a truss. The testicle, which had not descended lower than just outside the abdominal ring, had formed a valve, which admitted the passage of fluid into the sac, but prevented its return into the abdomen.¹ The testicle, in this case, seems to have acted much in the same way as the valvular fold of peritoneum which exists at the ring in many quadrupeds.

In operating for the removal of fluid in cases in which there is reason to suspect that intestine or omentum is also contained in the hernial sac, the surgeon should proceed in the most cautious manner. Monro, senior, relates the following case.²—"An old man had long labored under a hernia, which had not been reduced for many years. The tumor became at last of a monstrous size, descending nearly to his knee, and having a proportional transverse diameter: he was confined to lie on his back, had violent pain both in the tumor and his loins, and his flesh and strength wasted. In some places a plain fluctuation was perceived, without any of the unequal solid substances felt everywhere else. Neither the water nor solid substances could be pushed into the belly. The tumor being pressed, so as to make one of those parts where the fluctuation was most evident and the teguments were thinnest as tense and prominent as possible, a trocar, as small as a crowquill, was thrust very slowly through the teguments and cyst. Whenever the bag was pierced the stilet was taken out, and the canula was pressed a little forward, through which six pounds of clear serous water ran out; then the convolutions of the intestines and the knotty parts of the omentum were plainly felt, but none of them would reduce." The patient was greatly relieved of his pain, and no further operation was thought proper. Unless the fluid should accumulate in so large a quantity as to cause serious inconvenience to the patient, as in this remarkable case, an operation for its removal would not be proper; for the surgeon is not warranted in opening a serous sac containing intestine on slight grounds. If it became necessary

¹ *Recherches sur les Causes et l'Anatomie des Hernies Abdominales*, p. 97.

² *Medical Essays and Observations*, vol. v, p. 314.

to get rid of the fluid, acupuncture would be the plan best suitable to such a case. If the intestine or omentum were reducible, the application of a truss would be the treatment required.

CHAPTER V.

HÆMATOCELE.

HÆMATOCELE denotes the swelling occasioned by effusion of blood in the sac of the tunica vaginalis, or in a cyst connected with the testicle. It is also applied to tumors produced by extravasation in the substance of the spermatic cord, or in the sac of an encysted hydrocele of this part. The following table exhibits at one view the different forms of this affection :

Hæmatocele	{	Of the Testicle . . .	{	Vaginal .	{	Simple.
				Encysted.		Associated with Hydrocele.
	{	Of the Spermatic Cord	{	Diffused.		
				Encysted.		

SECTION I.

HÆMATOCELE OF THE TESTICLE.

In vaginal hæmatocele, which is by far the most common form of this affection, the extravasation may take place in a healthy state of the parts, or it may succeed or be combined with hydrocele. The first variety of vaginal hæmatocele occurs from the accidental rupture of some bloodvessel. It is usually produced by a blow. Thus it is liable to happen to a person on horseback, from the testicle being struck against the pommel of the saddle; or it may be occasioned by violent efforts made in straining, as in the attempt to raise a heavy weight. In these cases the testicle immediately enlarges, sometimes to more than double its natural size, from the rapid distension of the tunica vaginalis with blood.

The second variety of vaginal hæmatocele, in which the extravasation takes place in combination with hydrocele, is of more frequent occurrence than the first. It may also be produced by a blow, or by the wound of some vessel in the operation of tapping. The testicle, owing to its free mobility, does not often suffer from mechanical violence; but when hydrocele exists, the tumor, from its prominence and size, is exposed to injury. A blow occasions a slight rupture of the tunica vaginalis, and of some of the enlarged vessels ramifying outside it; and the blood which escapes passes into the sac and mixes with the fluid of the hydrocele, producing a sudden increase in the size of the tumor. The quantity of blood effused under these circumstances varies considerably. It may be merely sufficient to impart a red tinge to the serum. In general, however, it is greater in amount, and coagula are formed, which remain undissolved in the fluid. A hæmatocele may be produced, in the operation of tapping a hydrocele, in two ways. 1. It may be occasioned by the accidental wound of some vessel ramifying over the tunica vaginalis, which, instead of bleeding externally, or into the connective tissue of the scrotum, pours its blood into the sac of the hydrocele. This accident may occur when the operation is performed with a trocar, but is more liable to happen when the lancet is used. 2. A hæmatocele may be caused by the trocar or lancet penetrating too far, and wounding the testicle or spermatic artery. A case in which a hæmatocele was occasioned by a wound of the artery is recorded by Scarpa.¹ Mr. Fergusson relates that a man, in the habit of performing acupuncture for himself with several needles, on one occasion left a needle in the sac, which was quickly followed by the formation of a hæmatocele. The tunica vaginalis was laid open, the needle extracted, and the patient cured.² In hæmatocèles consequent on contusions, an opportunity of tracing the source of hemorrhage is very rarely obtained. When the parts are in a healthy state the bleeding probably proceeds from a rupture of some of the vessels ramifying between the tunica albuginea and the tunica vaginalis testis. In cases of hydrocele the parietal portion of the tunica vaginalis is ruptured, the blood being derived from the vessels of the scrotum. In the case of a man who had long had a hydrocele, and had received a severe

¹ Treatise on Hernia, tr. by Wishart, p. 76.

² Lond. and Edinb. Monthly Journal, July, 1843.

blow upon it, which suddenly increased the swelling, bruised the scrotum, and produced great pain from distension, Sir A. Cooper, on making an incision into it and discharging a large quantity of water and coagulated blood, found a rent in the tunica vaginalis, between one and two inches in length, covered with coagulum.¹

The blood effused often acts as a foreign body, and excites active inflammation in the tunica vaginalis, lymph is exuded, and this mixing with blood and serum modifies the appearance of the contents of the cyst, rendering it turbid and of a lighter color. The inflammation may go on to suppuration in the sac. It usually extends from the tunica vaginalis to the surrounding connective tissue and fascia, which in recent cases are found infiltrated with serum and lymph. In a case of hæmatocele, occasioned by the wound of a vessel in tapping a hydrocele, in which I was consulted, the inflammation which ensued caused in the course of a fortnight great thickening of the tissues external to the sac, and the formation of an abscess in the scrotum on one side of the hæmatocele. The inflammation is not always, however, of this active character. A chronic form of inflammation is sometimes set up in the sac as well as in the surrounding fascia and connective tissue. In these cases the internal surface of the tunica vaginalis is lined with plastic lymph, and instead of presenting its natural smooth and polished surface, is rough, granular, and irregular, and sometimes feels as tough as a piece of leather, having lost all the characters of a serous membrane. The sac and its investing tissues not only become extremely dense and firm, but sometimes acquire as much as half an inch in thickness. In old hæmatoceles the blood becomes changed into a substance resembling coffee-grounds, of a brownish-red, or chocolate color, and more or less fluid. The coagula sometimes present a cellular or honeycomb appearance, the cells being filled with a reddish serum. Occasionally the blood is found converted into a solid fibrinous substance, of a yellow or fawn color, arranged in firm layers, similar to the coagula lining the sac of an aneurism.

In hæmatocele the testicle preserves the same relation to the remainder of the tumor as in simple hydrocele, being situated at the posterior part, and rather below the centre. Its position, however, is liable to similar alterations as occur in hydrocele, and they are

¹ Lib. cit. p. 212.

dependent upon the same causes. I once witnessed an untoward event, which happened in the practice of a surgeon who was unaware of the testicle being out of its usual position. A young man with an inverted testicle became affected with hydrocele.¹ The case was converted into a hæmatocele by the wound of a vessel in the operation of tapping. Inflammation ensued, and it became necessary to lay open the sac. The surgeon, in carrying the incision to the lower part of the tunica vaginalis, divided the vas deferens, and severed the sound testicle nearly in two with his bistoury, the thickening around the sac having prevented him from detecting the gland in its unusual situation in front of the sac. This unfortunate accident obliged the surgeon to perform castration instead of incision. In describing the difficulties of distinguishing the position of the testicle, I shall have occasion to mention another case of hæmatocele occurring to an inverted testicle in which a similar injury was inflicted in the operation of incision, and the testicle was removed in consequence.

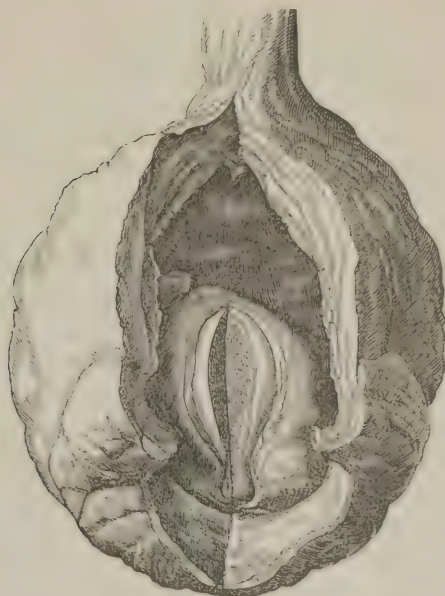
In chronic hæmatoceles it is said that the glandular structure of the testicle sometimes disappears as in old cases of hydrocele, atrophy being occasioned by the long-continued pressure arising from the extravasated blood. On examining the body of an elderly negro who died of disease in the lungs, Sir B. Brodie observed on the right side of the scrotum a large tumor, which was formed by the tunica vaginalis, distended with about twelve ounces of fluid having the appearance of coffee-grounds, with numerous masses of solid substance, manifestly fragments of coagulum, floating in it. The tunica vaginalis itself was much thickened. The substance of the testicle, the tunica albuginea, and the tunica vaginalis immediately covering it, were entirely destroyed, so that not a vestige of these parts could be discovered. The vas deferens adhered to the posterior part of the tumor, and was imperceptibly lost at the part where it usually joins the testicle. Sir B. Brodie likewise met with another case in which the appearances on dissection were precisely similar; but here also he unfortunately lost an opportunity of learning the history of the case during the patient's lifetime.² Judging

¹ In the first edition of this work I erroneously described the altered position of the testicle in this case to have arisen from adhesion of the gland to the front of the sac. I have since examined the parts, and have clearly made out the existence of an inversion.

² Lond. Med. and Phys. Journal, vol. lviii, p. 299.

from my own observations complete wasting of the testicle is a rare occurrence. In the examination of a large hæmatoccele which had existed for many years, and was removed by operation under the impression that it was a solid enlargement of the testicle, I found the tunica vaginalis nearly half an inch thick, and full of a soft

Fig. 25.



friable substance of a chocolate color; the testicle, which was situated at the posterior part of the cavity, was somewhat flattened, and partly embedded in the thickened cyst; but the glandular structure was perfectly healthy, and the bulk of the organ scarcely less than natural. The hæmatoccele, with the sac and testicle laid open, is represented in the accompanying engraving. The structure of the testicle is usually, indeed, sound in hæmatoccele, though its nutrition may be liable to become impaired when the disease is of very old standing.

Symptoms.—The first variety of vaginal hæmatoccele appears suddenly after a strain or the receipt of some injury. The testicle quickly enlarges to more than double its natural size, and forms a tumor, which is of an oval shape, tender, tense, and fluctuates indistinctly. If the affection be occasioned by a blow, this enlarge-

ment is accompanied with extravasation in the connective tissue of the scrotum, which conceals the hæmatocele. In one case which came under my notice, the amount of blood effused into the scrotum was so great that the hæmatocele was not detected for a week, the enlargement consequent upon the effusion into the vaginal sac being obscured and concealed by the blood extravasated around it. As the latter became absorbed, the former was rendered distinct, and subsided much more slowly. Slight pain and tenderness continue for some days, and then subside, leaving the swelling but little altered, except that it feels rather more solid than at first.

In the second variety, in which a hydrocele becomes converted into a hæmatocele, the tumor undergoes a sudden increase in size, and becomes more or less painful. It still preserves its pyriform shape and even uniform surface; but it feels very tense, and heavier and more solid than before, and fluctuates very indistinctly. In the course of a few hours, or on the following day, inflammation arises, the part feels hot and tender, the scrotum becomes tense and sometimes injected, and further enlargement ensues. These symptoms are attended with more or less febrile disturbance. Occasionally there is excessive pain, and high symptomatic fever; and the inflammation, if allowed to proceed, goes on to suppuration. In other cases the tumor from the first assumes an indolent character, becomes more firm and solid, and feels heavier than before, but undergoes no alteration in size. It may remain stationary in this condition for many years, producing no inconvenience beyond that which arises from its bulk and weight, which are sometimes considerable.

Diagnosis.—A vaginal hæmatocele may be distinguished from a hydrocele by the absence of transparency, the obscure character of the fluctuation, the heavy feel of the tumor when balanced in the hand, and the sudden and accidental mode of its occurrence. In old cases, in which the tunica vaginalis and its envelopes have become much thickened and indurated, the tumor possesses so firm a character, feels so heavy and solid, that it is very liable to be mistaken for a chronic enlargement of the testicle; and the diagnosis, at all times difficult, in some instances cannot be satisfactorily made out by the nicest manipulation of the most experienced hands. The records of surgery furnish many cases in which castration has been performed from a mistaken diagnosis: I have known three instances

of the kind myself. In chronic swelling of the testicle, whether from malignant deposit or other disease, the gland loses for the most part its natural sensibility; but in hæmatocele pressure on the back part, where the testicle is usually situated, occasions the peculiar pain always experienced when the organ is compressed. When the least doubt exists, it should in all cases be removed by the introduction of a lancet or trocar before any further operation is undertaken. Swelling of the scrotum from extravasation of blood in its loose connective tissue may arise somewhat suddenly after a blow; but the diffused nature of the tumor and its extension to both sides of the scrotum, the concealment more or less of both testicles, doughy feel, and red or dark color of the skin, are characters too clearly expressive of the nature of the case to mislead the practitioner.

Treatment.—In the first variety of hæmatocele, if the quantity of blood effused into the tunica vaginalis be small, the treatment should be simply antiphlogistic. The patient is to be kept in the recumbent position, with the testicle supported; a cold lotion is to be applied to the part, and the bowels must be gently acted upon. If the tenderness be considerable, or symptoms of inflammation arise, a few leeches should be applied to the scrotum, or, if there be much contusion of the part, to the corresponding groin. By such means inflammation may be prevented, and in the course of time the effused blood becomes absorbed. In general, this takes place very gradually and slowly, and several weeks may elapse before the blood is entirely removed. If the quantity of blood extravasated be large, so as to cause great tension of the tunica vaginalis and severe pain, and endanger the nutrition of the testicle, it would be necessary to lay open the sac by an incision, and to remove the blood. The part would afterwards heal by granulation. I have never had occasion to perform this operation in any case of injury, and I believe that it is very rarely called for.

When hæmatocele succeeds or is combined with hydrocele, the practice formerly, was at once to make an incision into the tunica vaginalis, and discharge its contents. This is not generally necessary. The blood effused, especially when in small quantity, often produces but little irritation, and becoming mixed with the fluid of the hydrocele may be readily removed by tapping, and the operation can be repeated afterwards at intervals until the fluid is free

from any red tinge. Even when inflammation arises the surgeon should not be too hasty in laying open the tunica vaginalis, for even then by emptying the sac with a trocar so as to relieve the tension, and afterwards by rest and antiphlogistic treatment, the inflammation may subside, and the operation may be avoided, as in the following case.—J. D., an ostler, aged forty-three, was admitted into the hospital on account of a large heavy scrotal swelling, which was highly inflamed, œdematous, and very tender. It appeared that he had been subject to hydrocele for some years, and that it had been tapped by a surgeon. When the swelling returned he punctured it himself with a penknife, and got rid of the water without any ill consequence. About a month before his admission he repeated the operation, but this time was not so fortunate, for the part soon became painful and enlarged. The swelling was afterwards increased by a kick from a horse. I kept him in bed, leeches the scrotum, and applied cold lotions for three days. Finding the swelling to be increasing, I inserted a large trocar, and drew off eight ounces of dark fluid blood with some small coagula, and ordered calomel and opium to be taken at night. The swelling returned quickly, but there was less pain and tenderness, and the œdema subsided. In four days I drew off five ounces more fluid blood. The part again enlarged for a few days, and then gradually subsided until all fluid had disappeared, and he was discharged, cured both of hydrocele and hæmatocele, seventeen days after his admission. In another case of hæmatocele from injury, in which the inflammation was less severe than in the preceding case, the hydrocele, which was of old standing, disappeared after the bloody fluid had been twice removed and the inflammation had subsided. When, however, the quantity of blood effused is large, and the inflammation very acute, with considerable local swelling and increasing thickening of the parts, absorption cannot be expected, and delay in operating will only lead to suppuration. The tunica vaginalis should be punctured with a lancet at its upper part, a director or the finger introduced, and the whole extent of the sac then laid open by an incision with a bistoury carried quite to its lower part, in order to prevent any bagging of the discharge afterwards. This must be done with care, so as to avoid wounding the testicle. In a hæmatocele with a very thickened sac, the difficulty of detecting beforehand the precise situation of this organ is very great, the

only available guide to its position being the peculiar sensation caused by its compression. But when the testicle is small, wasted, or well protected by the dense and thickened tissues, and when the tumor is so sensitive or the patient so timid, that he complains wherever pressure is applied, it is almost impossible for the surgeon to ascertain exactly the site of the gland. It is not therefore surprising that in hæmatoceles requiring incision, when the testicle is out of its usual position it should be extremely liable to injury. I have already alluded (p. 186) to a case of inversion in which the organ had been wounded in the operation. The following instructive case exhibits difficulties which would have embarrassed any surgeon, even the most experienced and cautious.—A Portuguese Jew, aged twenty-six, recently arrived in England, applied to me on account of a disease of the right testicle. The organ was enlarged to more than thrice its natural size, was opaque, felt firm, weighed heavy, and afforded an indistinct sense of fluctuation. The man looked healthy, and stated that the enlargement had existed twelve years, but had increased a good deal lately. In the expectation of finding fluid, I thrust a fine exploring trocar into the upper part of the swelling, but nothing except a few drops of blood appeared. Mercury was then taken until the mouth became sore, without any effect on the tumor. Being strongly impressed that fluid existed, I next introduced the exploring trocar into the lower part of the swelling, but with the same result as before. The punctures did not give rise to any increase of tenderness. The patient was now admitted into the London Hospital, and a consultation held on the case. The senior surgeon being of opinion that the disease might be the result of chronic orchitis, the tumor was strapped, and iodide of potassium given internally for a fortnight, when a slight increase rather than improvement being manifested, the plan was discontinued. At a second consultation it was determined, as the tumor had not yielded to treatment, that it should be removed by operation. It was supposed that the disease might be cystic. A very careful examination was made, and firm pressure exercised at different parts, in order, if possible, to ascertain the site of the testicle, but the man being very timid and sensitive to pain, and unacquainted with the English language, no information in reference to this point could be obtained. He was placed under the influence of chloroform, and, as a measure of precaution, a full-sized hydrocele trocar

was plunged into the upper and front part of the tumor where fluctuation seemed manifest. After the instrument had penetrated solid tissues of considerable thickness, resistance ceased, and on withdrawal of the trocar a small quantity of dark red grumous fluid loaded with cholesterine escaped. Suspecting now that I had to deal with a hæmatocele, a free incision was made in front of the tumor just below the puncture, when the appearance of tubuli convinced me that the disease was either cystic with the glandular structure spread over the surface, or a hæmatocele with the testicle occupying an abnormal position in front of the sac. The latter seemed most probable; and as it was considered that the gland had been seriously wounded both by puncture and incision, and that the sac was much diseased, castration was advised, and immediately performed. The case proved to be a chronic hæmatocele of an inverted testicle. The vas deferens passed down the front of the sac to the testicle, which was sound in structure, but flattened and spread out so as to occupy a great part of the front of the thick, dense, leather-like sac in which it was embedded. The trocar had transfixed its upper part. The patient recovered favorably. Had it been possible to ascertain the nature of the case and situation of the testicle before the operation, the tumor might have been incised at its back part and the testicle thereby preserved.

If in a recent case the spermatic artery or a vessel of any size be found wounded, and bleeding, it can be easily secured. In the case related by Scarpa, previously alluded to, the wounded spermatic artery was seen, after the tunica vaginalis had been laid open, pumping out blood. A poultice or the water-dressing is the only application necessary afterwards. The surgeon may leave a piece of lint between the edges of the wound to prevent union by the first intention; but it should not be carried to the bottom of the sac, or be placed in contact with the serous membrane. Severe symptoms and a good deal of constitutional irritation sometimes follow this operation: they are occasioned by acute inflammation of the exposed sac, which when large and dilated affords a considerable extent of surface. But in general the inflammation is relieved by the incision and consequent loss of blood, and under mild treatment the local irritation soon subsides. In old persons gangrene has arisen from the incision of a hæmatocele; and formerly, when it was the practice to stuff the bottom of the wound

with lint or other extraneous substances for the purpose of insuring sufficient inflammation, the operation was not altogether free from risk, especially in large hæmatoceles, and in persons of an unhealthy constitution.

I have recorded in the *Medico-Chirurgical Transactions*¹ the case of a gentleman, aged seventy-nine, to whom I was summoned on account of an attack of retention of urine from enlargement of the prostate gland. He had also, on the left side, a chronic vaginal hæmatocele, which had attained so large a size as to interfere with the introduction of a catheter. The tumor reached half-way down the thighs, and the penis was so completely buried in it that I was unable to reach the glans at the navel-like orifice in the integuments to pass the catheter. I had no alternative, therefore, but to lay open the hæmatocele, from which three pints of dark grumous blood were discharged. The thickening of the sac prevented its collapsing after the incision. The patient died a week afterwards. This is the only case of hæmatocele terminating fatally which has come under my observation.

In a very large chronic hæmatocele with great consolidation and thickening of the sac, the best operation, in persons advanced in life, is the excision of the whole of the mass. The loss of the testicle in such a case is of little importance; and the scrotal integuments contract so much after the removal of large tumors, that the wound would not only be comparatively small in size and much less than if the hæmatocele were incised, but would also heal readily instead of being the seat of protracted suppuration. This course was adopted by Mr. Bowman in the following case, which he kindly afforded me the opportunity of seeing in King's College Hospital, in January, 1853.—A laborer, aged fifty, two years before received a blow on his left testicle, which afterwards gradually enlarged until it reached the size of a goose's egg. This swelling was also struck accidentally, and from this time rapidly increased to a great size. The tumor was pyriform in shape, firm, tense, opaque, but not at all tender. It reached nearly half-way down the thighs. By firm pressure at a spot in the back part I was able to make out the position of the testicle. Mr. Bowman punctured the swelling with a trocar, and gave issue to about fifty ounces of dark red fluid, which partly coagulated, and

¹ Vol. xxxiii, p. 241.

contained abundance of red globules. The tumor in a week regained nearly its former size. Having evacuated about a pint of dark-brown fluid by puncture, Mr. Bowman excised the whole mass, and after tying numerous vessels, closed the wound with sutures. The patient recovered favorably in about a month. The tunica vaginalis was greatly thickened by extensive layers of fibrine deposited within the sac. The testicle was sound, but concealed and flattened by the fibrinous exudations.

Encysted Hæmatocele of the Testicle occurs when a cyst developed from the epididymis becomes the seat of bloody effusion, instead of the fluid which it usually contains. It may arise from external violence, as in the following case.—My former colleague, Mr. Hamilton, requested me to examine a painful tumor connected with the testicle of a patient in the hospital. He was a Jew, aged eighteen, who had received three months before an injury of the left testicle. He stated that the scrotum became much swollen, and that the tumor was observed afterwards. I found a swelling the size of a chestnut just above the testicle, quite movable and loose in the scrotum, but attached to the upper part of the gland by a small neck. It was firm, but gave an indistinct feeling of fluctuation when examined. Handling caused pain. Mr. Hamilton punctured the cyst with a lancet, and discharged a quantity of dark coagula contained in a thick firm cyst, lined by a rough false membrane. The part healed favorably by granulation. The patient had no recollection of any tumor connected with the testicle before the injury; but knowing how frequently small cysts springing from the epididymis are present without being noticed, I have little doubt that one existed in this instance, and that the injury had caused effusion of blood into the cyst. This produced inflammation and thickening of the sac, and accounted for the tumor becoming painful and enlarged.

The following complicated case of twofold hæmatocele, an old and a recent one combined on the same side, affords a good example of encysted hæmatocele of the testicle.—In 1853, a man, aged forty-nine, who had had a swelling of the left testicle for thirteen years, came under my care at the London Hospital in consequence of the tumor becoming rapidly larger and very painful. It reached half-way down the thigh, and was heavy, firm, and very tender. Finding an obscure feeling of fluctuation, I punctured the swelling

with a trocar, and removed twenty-four ounces of a thick dark grumous fluid. Considerable thickening remained at the upper part, which was also extremely tender. The testicle was felt quite at the bottom of the thickened sac. The tumor quickly increased nearly to its former size. Six days after the puncture I drew off ten ounces of a similar fluid, and then made a free incision along the front of the sac, dividing tissues of great thickness and density. The incision exposed a quantity of soft dark recent coagula at the upper part of the tumor, and opened below a very large cyst thickly coated with tough layers of lymph, the inner surface of which was rough and of a reddish-brown color. The walls did not collapse. Considering that castration was attended with less risk than leaving the parts to suppurate, especially as the man was not in sound health, and that he was not likely to feel the loss of a testicle, I excised the whole of the morbid parts. On dissection, the large sac proved to be an encysted hydrocele of the epididymis converted into an old hæmatocele, the recent coagula being lodged between the thick layers of adventitious membrane lining the cyst. The testicle was found distinct at the bottom of the sac, and not embedded in the thickened walls as in vaginal hæmatocele. The surfaces of the tunica vaginalis were adherent, partly by old and partly by recent adhesions. The epididymis was drawn up and lost in the walls of the large cyst. Recent depositions in a beaded form were observed in the testicle, and the ducts were loaded with a granular substance, the result of fatty degeneration. The patient's recovery proved tedious.

Sir A. Cooper has recorded a case of hæmatocele, the cyst of which, we may safely conclude from his description, was originally an encysted hydrocele of the testicle; but this eminent surgeon does not appear to have recognized its true character.¹

This form of hæmatocele is very little known, and when it occurs is liable to be mistaken for a vaginal hæmatocele or a hæmatocele of the spermatic cord. It may generally be distinguished from the former by the presence of the testicle distinct from the tumor, and below or in front of it, for even in cases where the sac is dense and much thickened the gland is not sunk and buried in the tumor as in vaginal hæmatocele, but in a careful examination may be de-

¹ Lib. cit. p. 210.

tected on the surface. The treatment applicable to encysted hæmatocele is the same as that required for vaginal.

SECTION II.

HÆMATOCELE OF THE SPERMATIC CORD.

Hæmatocele of the spermatic cord occurs in two forms, the diffused and encysted.

Diffused hæmatocele was first noticed by Mr. Pott. It is liable to be produced by the accidental rupture of a spermatic vein during violent and sudden exertion, as in straining to lift a heavy weight, when blood immediately escapes into and infiltrates the loose connective tissue along the cord, where it accumulates, its further diffusion being prevented by the fascious envelope of this part. Mr. Pott has related three cases, all of which occurred in this way. Diffused hæmatocele of the cord may also be occasioned by contusion. It may happen, in both ways, to persons in good health, and whose genital organs are free from disease, but a varicose state of the veins or fatty degeneration of the arteries are conditions favorable to its occurrence. The complaint is rather rare.

The symptoms of this affection are very similar to those of diffused hydrocele of the cord; from which however it may be distinguished by its sudden appearance, and in cases where it results from contusion, by ecchymosis of the scrotum and groin. I have met with slight hæmatocele of the cord coupled with more or less effusion of blood in the scrotum in several instances. The swelling of the scrotum did not prevent my detecting a defined tumor of the cord, but in one case the hæmatocele was not recognized for several days, the effusion in the scrotum concealing the hard and defined swelling produced by the effusion in the spermatic cord. Mr. Pott relates the following case.—A laboring man who had fallen down with a load on his back, was brought into St. Bartholomew's Hospital for a supposed rupture, a swelling having appeared in the groin and scrotum immediately after the accident. The tumor seemed to occupy the whole spermatic process, which was so enlarged by it that it was impossible to feel the passage of it from the abdomen through the muscle; but the testicle below it was perfectly distinct. The appearance of a tumor, the suddenness of its formation, the distinct fluctua-

tion of the testicle below, and the circumstance of the man's not having had a stool for two days past, inclined Mr. Freke to believe it to be hernia, and to treat it accordingly. After fruitless attempts at reduction, he determined upon an operation. He divided the superficial parts and tendinous opening in the abdominal muscle, and made several trials to reduce what he supposed to be the gut without opening the sac, but ineffectually. He was at length obliged to lay open the containing membrane, when a large quantity of blood, partly fluid and partly grumous, burst forth, and the whole tumor subsided. The parts were washed, and search made for the bleeding vessel, but it could not be found. The wound was dressed, and the man got well.¹ In this case it does not appear that there were any urgent symptoms of hernia demanding an operation. The costive state of the bowels was an accidental circumstance, which might have been shortly removed by the exhibition of a purgative. An operation can very rarely be required in any case of diffused hæmatocele. If left alone, the blood will in the course of time be removed by absorption. All that appears to be required in the way of treatment is to check any tendency that may arise to inflammation. If the tumor, however, should continue to increase, hemorrhage still going on and infiltrating the connective tissue, it may become necessary to make an incision, in order to secure the bleeding vessels. This appears to have been necessary in the following case detailed by Mr. Pott.—A young fellow straining at stool felt a sudden pain in his left groin; and, upon examination, found a swelling extending from thence into the scrotum. He took it for a rupture, and immediately applied to an advertising operator, who, after unsuccessful attempts to reduce it applied a truss. After some days, during which the pain and swelling increased, he was seen by Mr. Pott. The tumor was large, and had somewhat the feel of an omental hernia; the abdominal aperture seemed dilated; the testicle was tolerably distinct below; pain in the erect posture was considerable, but in a supine one very little: he had neither heat, quickness of pulse, hiccough, nor vomiting, and had been thrice at stool that day. Notwithstanding he was bled freely and kept in bed, the pain and tumor increased, and fluctuation became palpable. Thinking that the fluid might possibly be collected in the sac of an omental hernia, Mr.

¹ Lib. cit. Case XXX, p. 456.

Pott made a puncture with a lancet, and let out some ounces of clear blood. The hemorrhage continuing for three or four days, an incision of some length was made up to the groin, and the cellular membrane of the spermatic process was found loaded with extravasated blood. The wound was dressed with lint pressed out from a styptic; but an alarming return of the hemorrhage soon after induced Mr. Pott to perform castration.¹ Modern surgeons will not be inclined to admit that castration was "the only remedy in this case." Had diligent search been made for the vessel, I should think it might have been found and secured.

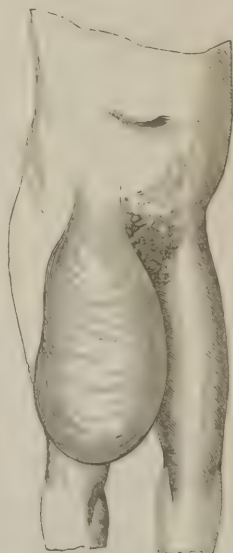
Mr. Bowman has recorded² a very remarkable case of hæmatocele of the spermatic cord, in which the tumor attained an extraordinary size, and ultimately proved fatal. The subject of it was a farmer nearly sixty years of age. About ten years before his death he was thrown from his horse, and received a blow on the right groin, which gave rise to a swelling confined to the inguinal canal and resembling a hernia. It could not however be reduced, had no impulse from coughing, and was accompanied with ecchymosis. The pain and ecchymosis subsided, and he resumed his ordinary pursuits; but the swelling, which was as large as a hen's egg, oval, firm, and elastic, remained nearly stationary for seven years, when, during exertion in walking, it became suddenly larger and heavier, blood being also largely effused in the scrotum. After the disappearance of the ecchymosis, the tumor manifested a disposition to augment. A surgeon introduced a trocar, which was followed by a gush of blood. The puncture healed, but the tumor continued to increase until it attained a vast size. Mr. Bowman, on visiting the patient, found him confined to his bed from sheer inability to drag so great a substance about with him. As represented in Fig. 26, the tumor reached to the patella, had an oval shape, and was so heavy that it required two hands and no slight effort to raise it. Its surface was crossed by very large veins. The right testicle was at the lowest part of the tumor, resting on the knee-joint, and formed no part of the diseased mass. The tumor was tympanitic at its most elevated parts, and seemed to contain air mixed with fluid. This sign with a low irritative fever rendered it probable that the contents had become decomposed since the last puncture. It was therefore deemed desirable to lay open the part to give vent

¹ Lib. cit. Case XXXI, p. 458.

² Lib. cit.

to the gas and other putrid matters. Mr. Bowman made an opening three inches in extent, and discharged a large quantity of dark-brown putrid blood of the consistence of treacle mixed with large masses of old coagulum, altogether nearly filling two large wash-hand basins. In the reduced condition of the patient, it was not considered safe to attempt the removal of the entire tumor. A counter-opening was made at the lower part without interfering with the testicle. The walls of the cavity being firm and solid collapsed but little. He survived the operation only five days. No *post-mortem* examination was made, and it must remain doubtful whether the origin of the hæmatocele was arterial or venous.

Fig. 26.



Encysted Hæmatocele of the Spermatic Cord.—The Pathological Museum of St. Bartholomew's Hospital¹ contains a specimen of this disease. The cyst is empty; but it is described to have contained blood, and its walls are deeply stained with the color of partially decomposed blood. Its lining membrane is wrinkled and coarsely granular, and the tissues around it are thickened, brawny, and adherent together. In the Hunterian Museum there is a specimen (No. 2460) of old encysted hæmatocele of the spermatic cord. (Fig. 27.) A good-sized cyst, lined by a membrane, polished and a little wrinkled, is filled with a soft tawny-looking granular matter (3), resembling the altered coagulum of blood observed in ordinary hæmatocele after long maceration in spirit. The tissues around the cyst are thickened and indurated, just like those around an old hæmatocele of the testicle. There is a hernial sac immediately above it (2), and a hydrocele below, with the sac open for some distance up the cord as far as the cyst of the hæmatocele. The latter does not communicate either with the tunica vaginalis or the hernial sac. In the Musée Dupuytren in Paris there is also a preparation of this affection which occurred in the practice of M. Blandin.

¹ Series 22d, No. 11, in printed Catalogue.

This form of hæmatocele is very uncommon, the small size of the cyst and its protected situation fully accounting for the rarity of

Fig. 27.



the contents of an encysted hydrocele of the cord becoming mixed with or changed to blood. Its diagnosis is extremely difficult; indeed the nature of the case could hardly be determined positively without a puncture. We should expect that an existing hydrocele of the cord would suddenly enlarge and become painful; that it would lose its transparency, fluctuate less distinctly, and feel more firm and solid than before. Two cases in which an encysted hæmatocele of the cord was met with during life, and its character determined by an opening made into the cyst, are recorded by M. Beraud.¹ One occurred to M. Velpeau, the other to Dr. Cabaret. The latter was complicated with vaginal hydrocele and enlargement of the testicle.

An encysted hæmatocele of the cord should be treated in the same way as a hæmatocele of the testicle. In slight cases sufficient relief may be afforded by rest and antiphlogistic measures: if the tumor should become painful and inflamed, or show no disposition to disperse, the blood must be liberated by an incision, and the wound be encouraged to heal by granulations from the bottom of the cyst. This treatment was adopted with success in the two cases mentioned by M. Beraud.

CHAPTER VI.

ORCHITIS.

INFLAMMATION of the testicle occurs in two forms, acute and chronic; and it may commence either in the body or secreting part

¹ Archives Générales de Médecine, 4e série, t. xxv, p. 299.

of the organ, or in the epididymis. Inflammation beginning in the body of the testicle may be idiopathic, or may be excited by external violence; the disease is at first confined to the interior of the organ, the epididymis and tunica vaginalis being affected only secondarily, and sometimes entirely escaping. Orchitis is far more frequently a consecutive affection than a primary, the inflammation being transmitted from the urethra along the vas deferens. In this latter form of orchitis, which is familiarly known by the term *hernia humoralis*, the epididymis is first attacked, and the tunica vaginalis generally participates in the disease.

SECTION I.

ACUTE ORCHITIS.

Few pathologists have examined a testicle in a state of acute inflammation, and I am unacquainted with any authentic account of the alterations in structure from inflammation originating in the body of the gland. Many years ago I twice had an opportunity of inspecting a testicle affected with acute secondary orchitis; and the following description of the pathological appearances is drawn up from these examinations, and from the account of the dissection of two testicles affected with gonorrhœal inflammation recorded by M. Gaussail.¹ The tunica vaginalis is more or less distended with lymph, or albuminous matter infiltrated with reddish serum, which form loose adhesions between the opposed surfaces of the membrane; these adhesions are so slight as easily to admit of being broken down with the finger. The membrane is injected with a multitude of minute red vessels, which ramify in various directions, and form a compact network. At a later period red vessels may be traced, proceeding from the free surface of the tunica vaginalis to the false membranes forming the adhesions. The volume of the testicle is very little, if at all increased, the great bulk of the tumor being occasioned by the swollen epididymis and effusion into the serous sac. When cut into, the gland appears somewhat darker than natural, from a congested state of its vessels. The epididymis, particularly the lower part, is enlarged to twice, and sometimes thrice its natural size, and feels thick, firm, and indurated. This

¹ Memoire sur l'Orchite Bleimorrhagique. Archives Générales de Médecine, tom. xxvii. p. 210.

enlargement is produced by the exudation of a brownish deposit in the connective tissue between the convolutions of the duct. The coats of the vas deferens are thickened, and the vessels ramifying near them injected, sometimes along the whole extent of the duct. Exudation matter is found in the connective tissue around the tortuous part of the vas deferens and tail of the epididymis, which frequently forms the bulk of the swelling observed in these cases. Owing to the epididymis being the part chiefly and most constantly affected in consecutive orchitis, the disease is frequently called *epididymitis*.

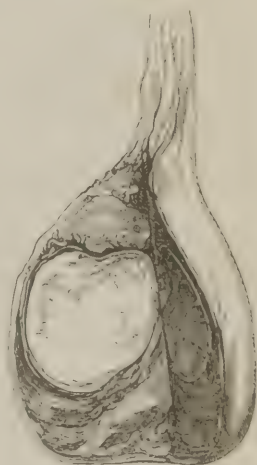
In treating of the acute inflammatory changes in the tunica vaginalis (p. 106), I remarked that the inflammatory action was very liable to extend to the substance of the epididymis, but not to the body of the testicle; and I noticed the pathological law enunciated by Gendrin by which this circumstance was accounted for. We find, too, that inflammation of the epididymis is much more readily propagated to the tunica vaginalis than inflammation originating in the glandular structure of the testicle. When inflammation commences in the body of the gland, the enlargement takes place slowly, and is seldom considerable until the disease has existed for some length of time, which is easily explained by the unyielding texture of the tunica albuginea, and the circumstance of the tunica vaginalis remaining unaffected. Suppuration occasionally takes place in this form of orchitis, whereas in consecutive inflammation the formation of pus in the substance of the gland is of very rare occurrence. I do not mean, however, to assert that the glandular structure of the testicle never suffers in consecutive orchitis, for I believe that it does so in some instances; but, according to my observations, it very commonly escapes, the inflammation not extending further than to the epididymis.

Inflammation of the testicle rarely terminates in suppuration. But when it occurs, owing to the thickness and density of the tunica albuginea, the matter is slow in making its way externally. It burrows in the gland, and disorganizes its delicate structure. The matter sometimes becomes encysted, forming a separate abscess. In these cases, after all inflammation has subsided, the more fluid particles becoming absorbed, the pus remains for a considerable time in the form of an indolent concrete mass, which has been mistaken, after death, for tubercular deposit. The pus, when found in this

concrete state, appears at first sight very like crude tubercular deposit ; but on further examination, it will be found to be contained in a distinct cyst, from which it may easily be separated ; whereas in tubercular disease the morbid deposit is in immediate contact with the disorganized tubules. Concrete pus may likewise be mistaken for the firm yellow exudation matter effused in chronic inflammation. It differs from it, however, in being friable and easily broken up, and also in being inclosed in a cyst ; whereas the yellow fibrinous substance is homogeneous and consistent, and almost inseparably connected with the tubuli around it. The distinctive characters just described will be easily recognized on comparing the accompanying representation of concrete pus encysted in the testicle from a preparation in the collection of the late Sir A. Cooper, with Figs. 31 and 36. I examined two enlarged testicles taken from a man who died somewhat unexpectedly from a disease of the larynx. Both glands had formerly been attacked with acute inflammation, and for some months before death they had been the seat of chronic pain. In the left testicle, which was the larger of the two, from two to three drachms of thick yellow inspissated pus were contained in a distinct cyst, which occupied the centre of the gland.

There was no trace of tubuli seminiferi, but the remainder of the organ was composed of a fibrous tissue: the sac of the tunica vaginalis was obliterated by close adhesions. The tunica vaginalis of the right testicle contained about half an ounce of yellowish serum ; in the centre of the gland there was a small concrete abscess, but the tubular structure was apparent, and apparently very little diseased. Pus existing in this concrete or inspissated state may keep up pain and irritation for a long period, and render the testicle liable to repeated relapses of inflammation. Suppuration also occurs in the epididymis. In neglected cases of consecutive orchitis an abscess sometimes forms in the connective tissue around the termination of the epididymis and inflected portion of the vas deferens, and bursts at the most depending part of the scrotum.

Fig. 28.



I have not myself met with any instance in which acute orchitis had ended in gangrene. The late Mr. Harvey Ludlow has recorded, in his Prize Essay, a case of acute inflammation of the body of the left testicle occurring to a man in St. Bartholomew's Hospital, who was in feeble health, and had suffered much from stricture. In consequence of the severity and obstinate character of the pain, Mr. Stanley made an incision into the testicle. A very small quantity of ichorous pus issued, but a cavity was exposed, the walls of which were formed by the glandular substance in a black gangrenous condition, and exhaling an offensive odor. On examination of a portion of the black substance in the microscope, it was found to consist of tubules with air bubbles between and inside of them. The testicle subsequently protruded; and after death, which occurred chiefly from peritonitis, nearly half the gland was found to have perished. The epididymis was unaffected: the gangrenous inflammation had been confined to the body of the gland.

In many instances, after acute orchitis has subsided, the testicle is restored to its natural condition; in other cases, permanent changes of a serious nature are the consequence. I have observed in testicles that have been affected with inflammation some time before, that the septa appear to be more distinct, and to enter more largely into the composition of the gland than is natural; that the seminal tubes are less numerous and apparent; and that a great part of the organ is converted into a dense white fibrous tissue, without the presence of tubuli. In these cases the lymph exuded in the connective tissue between the tubes, instead of being absorbed, becomes changed into the dense tissue just described; the ducts also undergo fibrous degeneration, and disappear. Complete atrophy is one of the most serious results of acute inflammation. In Chapter II, the disturbance in the organization of the testicle consequent upon inflammation was noticed as the most common cause of wasting, and several examples of it were adduced. Consecutive orchitis, if neglected at its onset, seldom subsides without leaving behind distinct traces of its existence, which never disappear entirely during the remainder of the patient's life. The epididymis frequently remains enlarged, presenting an indurated irregular knotty swelling, seated usually at its lower part, which is occasioned by the presence of a dense hard deposit between the convolutions of the duct and around the inflected portion of the vas deferens. On making a

section of the epididymis in this state, I have often observed not only a highly thickened condition of its duct, but also, in some instances, very considerable dilatation; so that the point of a fine probe might be introduced into the canal without difficulty, its area being increased four or five times. These remarkable dilatations are owing to seminal engorgement consequent on obliteration from inflammatory exudation of the excretory duct in the tail of the epididymis or inflected portion of the vas deferens. The occasional occurrence of such obstructions has been fully confirmed by the researches of M. Gosselin. In the examination of several testicles taken from bodies after death, he found the duct of the epididymis dilated, the canal at the seat of induration in the globus minor being at the same time impermeable to the finest injections.¹ In old cases the tail of the epididymis acquires great density and consistency, and sometimes becomes the seat of earthy deposits. These changes are rarely found without the presence of old adhesions, obliterating partially or completely the sac of the tunica vaginalis. The coats of the vas deferens are also found for some extent thickened and indurated. The alterations noticed in the body of the testicle have been observed, in some instances, coexisting with those in the epididymis; but in by far the majority of cases, the glandular structure is unimpaired. In only two cases in which the epididymis was thus diseased, have I remarked a decidedly atrophied condition of the organ.²

¹ Archives Générales de Médecine, 4e série, t. xiv et xv.

² The view that the glandular structure of the testicle commonly escapes in consecutive orchitis has been called in question (Brit. and For. Med. Review, vol. xvii, p. 77), and said to be opposed to the opinion of Sir A. Cooper, who remarks, "In general I observe that when there are marks of inflammation upon the tunics of the testis, such as, for example, adhesion, the substance of the gland itself is changed, the septa are much more apparent than natural, the seminiferous tubes appear to be less in number, are undoubtedly much reduced in size, and many become cords instead of tubes." Consecutive orchitis is so common an affection, and inflammation of the tunica vaginalis and epididymis is so frequently excited in the treatment of hydrocele, that the question at issue is of no light importance. I have paid further attention to the subject, and must adhere to my original statement, "that in by far the majority of cases, the glandular structure is unimpaired;" an observation intended to apply also to its secreting powers. That repeated attacks of orchitis, occurring from disease in the urethra, will occasionally prove injurious to the structure and affect the functions of the testicle, I have by no means denied; indeed, as I shall show in treating of chronic orchitis, that form of inflammation (which is often excited by disease in the urethra) usually occasions more or less disorganization of the gland. My observation applies to ordinary consecutive orchitis, which is so commonly met with in practice.

The observations made in Chapter I (Section II) are sufficient indeed to show that an obliteration of the excretory duct of the testicle may, and commonly does, take place without impairing the nutrition of the testicle, and without affecting the desire for and power of coition. But such an obstruction, if complete, must of course prevent the escape of the sperm, and when existing on both sides cause sterility. M. Gosselin has made some curious researches in relation to this subject.¹ He carefully examined the semen in twenty individuals who had been attacked with double epididymitis after gonorrhœa. In fifteen of these cases, which were comparatively recent, a callosity existed in the tail of the epididymis at the time that they seemed to be cured. In all, the genital functions appeared fully restored and the sperm normal. The semen was repeatedly examined at intervals of several weeks, but no spermatozoa were detected. M. Gosselin lost sight of all but two cases, and in these the return of spermatozoa in the semen occurred after some months, and coincidently with the complete disappearance of the induration in the epididymis on one side. In the remaining five of the twenty cases the double epididymitis had occurred several years previously. One man, aged forty-five, had been attacked twenty years before, but the left callosity no longer existed, and spermatozoa were found in the semen. In another man the disease dated back five years, and had left a considerable induration at the lower part of each epididymis. The general health was good: no spermatozoa could be detected. In the three other cases the disease had occurred ten, six, and four years before. There was hardness on both sides. The testicles were otherwise unaltered. The indications of virility were quite satisfactory, and the semen presented its usual appearance. The individuals had all been married several years, but had no children. The sperm was carefully examined, and found destitute of spermatozoa. One of them had had children by a former wife before the attack of double epididymitis. My experience induces me to question whether an obstruction to the course of the semen, from the organization of lymph exuded around and within the convoluted duct, occurs in epididymitis, either temporarily before the removal of induration, or permanently in neglected cases, so frequently as M. Gosselin's researches would lead us to suppose. I cannot attempt to supply data of the same cha-

¹ Archives Générales de Médecine, 5e série, t. ii.

racter as those which he has furnished; but I have met with several cases of double epididymitis attended with considerable swelling and induration, and the subjects of the disease have certainly not afterwards been wanting in the power of fecundating the ovum. He has shown in these inquiries that the callosity obstructing the canal may disappear at the end of three, four, five, and even eight months, and leave the course of the semen free. The rarity of any evidence of such obstructions in my own practice is probably owing, therefore, to the care taken in the treatment to prevent their occurrence; and I quite agree in M. Gosselin's practical conclusion, as to the importance of obtaining an absorption of the exuded lymph in these cases, for, as he has clearly ascertained by anatomical investigation,¹ the plastic effusions amongst the convolutions of the tube occurring in inflammation sometimes produce permanent obliterations of the duct.

Acute orchitis may arise from various causes. It may be produced by contusion, as from a kick on the part, or a blow against the pommel of a saddle, the patient being jerked forwards in riding; or by compression occasioned by crossing one thigh upon the other, or by other accidental injury. It sometimes appears to arise from exposure to the vicissitudes of the weather, assuming a rheumatic character. Great excitement of the sexual organs, without the opportunity of indulging the passions, may also lead to inflammation of the gland; in many instances the disease is developed without any evident cause.

The testicle is liable to inflammation during the subsidence of an attack of cynanche parotidea or mumps. The orchitis is usually slight, and seldom requires any other than mild treatment. M. Rilliet, in a careful account of an epidemic visitation of mumps, which prevailed at Geneva in the years 1848 and 1849,² noticed that the orchitis usually appeared on the sixth or eighth day, reaching its height in from four to six days. The body of the testicle rather than the epididymis was attacked. When the latter was affected, it was to a less extent than the testicle, and never exhibited the hardness observed in gonorrhœal orchitis. The cord was sometimes a little enlarged. The greatest number of persons attacked were between twenty-three and thirty-eight years of age:

¹ Archives, 4e série, t. xiv et xv.

² Gazette Médicale de Paris, t. l. p. 42.

the youngest was fourteen, the eldest forty-five. It is supposed that orchitis in mumps arises from the translation of inflammation from the parotid to the testicle. But M. Rilliet observed no case of *metastasis*, properly so called, nor any example in which the orchitis suddenly disappeared and the parotitis returned. The orchitis was oftenest unilateral, while the parotitis was most frequently double. In twenty-three cases, orchitis was observed on the right side in thirteen, on the left in six, and in four it was double. In two cases there was orchitis without parotitis. It is commonly believed that wasting of the testicle is a frequent result of this complaint. Sir A. Cooper met with no instance of the kind in his own practice; and no case has come under my observation,¹ nor have I heard of any amongst the different medical friends of whom I have made inquiries. Dr. R. Hamilton, the first writer who gave a particular description of this affection, has related two cases of atrophy of the testicle, succeeding the orchitis, occurring in mumps. One was the case of a gentleman about forty years of age. On the morning of the fourth day of the attack the testicles began to swell. On the fifth day both glands were much tumefied, the right by far the most so. After all disease had ceased, the right testicle, which had been chiefly affected, continued gradually to waste away, till at length a mere empty bag, consisting of the coats only, remained. The second case was that of a young man, twenty-five years of age, who was attacked by this distemper. Upon the tumid salivary glands subsiding suddenly, the testicles became affected. One of them was much more swelled than the other, and was found when the swelling was reduced, to be diminished more than one half of its natural size, at which it remained two months afterwards.² M. Rilliet noticed in two of the cases observed in Geneva, a marked diminution in the size of the testicle. In one the organ was reduced in size one-half, and the atrophy remained ten months after the attack.

I have remarked that inflammation of the testicle is far more frequently met with as a consecutive affection than as a primary. This gland is directly connected through the medium of the vas deferens with the urinary organs, the lining membrane of its numerous minute ducts being continuous with the mucous membrane

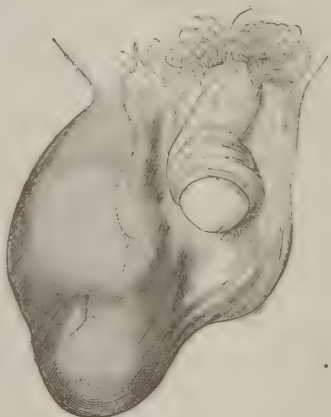
¹ A middle-aged married man in the London Hospital on account of lumbar abscess had one of his testicles completely wasted, which he attributed to an attack of mumps in his youth; but whether correctly so I had no means of ascertaining.

² Trans. of Royal Society of Edinburgh, vol. ii, art. ix, p. 59.

of the urethra. Any irritation, therefore, affecting that part of the urethra where the vasa deferentia terminate, is liable to be propagated to the testicle, and to cause it to inflame. In cases of gonorrhœa, in which the inflammatory action has reached that part of the canal, or of stricture, in which the portion of the urethra behind the obstruction has become diseased; when the urethra has been irritated by foreign bodies, as calculi or instruments, or by an enlarged prostate gland, or disease of the vesiculæ seminales; in morbid states of the prostatic part of the canal, from the excitement of excessive onanism or sexual indulgence, and after its division and laceration in the operation of lithotomy, the irritation and inflammation are frequently transmitted to the testicle, and give rise to orchitis. Of all the causes here mentioned gonorrhœa is by far the most common. Orchitis is indeed so frequent a sequel of gonorrhœa, that it is generally treated of by writers in connection with this affection, and few pathologists have drawn any distinction between this and the idiopathic and accidental form of the disease. Secondary orchitis differs, however, from the latter, in many important respects.

Orchitis may arise at all periods of a gonorrhœal discharge, during its early and acute stage as well as towards its termination, though it more frequently commences when the pain and discharge begin to subside. It is a common observation, that when inflammation of the testicle supervenes in gonorrhœa, the pain in making water and urethral discharge cease altogether, or undergo considerable diminution, but return as the orchitis subsides; which has led to the opinion that the orchitis is occasioned by a metastasis, or sudden translation of the inflammation from the urethra to the testicle. The doctrine of metastasis, to explain the phenomena of disease, has been too often adopted on insufficient grounds. It is extremely questionable whether anything of the kind ever takes place in gonorrhœal

Fig. 29.



Acute Orchitis attendant on Gonorrhœa.

orchitis. Assuredly it does not in the majority of cases, in which the inflammatory action may be traced gradually creeping along the vas deferens to the epididymis. In these cases, nevertheless, the pain and discharge from the urethra diminish generally, though not constantly, during the early stage of the disease. Several of the French pathologists have taken considerable pains in investigating the connection supposed to exist between the state of the discharge and the inflammatory action in the testicle. In sixty-seven of seventy-three cases observed by M. Gaussail, the discharge and other symptoms of gonorrhœa diminished more or less from the first appearance of the disease. In fifty-eight out of eighty-one patients noticed by M. Aubry, there was a considerable diminution of the discharge at the commencement of the attack.¹ M. D'Espine states that in six out of twenty-nine cases, the discharge underwent no modification on the accession of orchitis. In twenty-two cases the discharge was variously modified: it was either increased, diminished, or suppressed; but more frequently these modifications occurred only before or after the orchitis, the amendment of which was not in general followed by a return of the discharge to the state in which it existed before the inflammation of the testicle. In only three cases did the running, after having been suppressed at the commencement of the affection, reappear and increase as the acute symptoms of orchitis subsided.² Mr. Hunter states, that he has known cases where the testicle has swelled, and yet the discharge become more violent; nay, that he has seen some instances where a swelling has come on after the discharge had ceased, yet the discharge has returned with violence, and remained as long as the swelling of the testicle.³ The recurrence of the pain and discharge is not essential to the doctrine of metastasis; on the other hand, the marked amelioration of the gonorrhœal symptoms cannot be regarded as adequate proof of its occurrence. It is well known that when a part becomes actively inflamed, the symptoms of inflammation going on in another part, especially if it be in near proximity, usually diminish, though the two parts are not directly connected or continuous with each other. The effects of blisters

¹ *Recherches sur l'Epididymite Blennorrhagique*, Archives Générales de Médecine. Mai, 1841.

² *Mémoire Analytique sur l'Orchite Blennorrhagique*, Mémoires de la Société Médicale d'Observation, tom. i, p. 494.

³ *Treatise on the Venereal Disease*, 4to. p. 55.

and other counter-irritants in relieving inflammation of internal organs afford a familiar illustration of this remark; and I once had an opportunity of observing, in a case of orchitis occasioned by a blow, that the symptoms of a gonorrhœa, with which the patient was affected at the time of the injury, subsided, as is often witnessed in ordinary cases of secondary inflammation of the gland. It is clear that Mr. Hunter entertained considerable doubt as to the influence of metastasis in these cases—a doctrine which was generally admitted in his day. Thus he remarks, “Although an action in the urethra is the remote cause, yet it is still impossible to say whether it be the cessation of that action that is the cause of the swelling of the testicle, or the swelling of the testicle the cause of the cessation.” Inflammation frequently attacks the epididymis and testicle of persons laboring under gonorrhœa, apparently without any previous affection of the vas deferens. It is in such cases only that the orchitis can be attributed to a metastasis. But when we consider how readily inflammatory action may be propagated from one part to another along a continuous membranous surface, as from the mucous membrane of the bladder to the kidney; how rapidly this transmission may take place without the inflammation remaining fixed in any part of the continuous membrane a sufficient time to produce any evident signs of disease; how rarely it happens that the gonorrhœal symptoms entirely subside as the orchitis becomes developed; and how seldom orchitis occurs when the discharge is quickly arrested by specific remedies or injections;—we cannot readily admit that the affection of the testicle commonly owes its origin to a translation of disease from the urethra, or assent to the doctrine of a metastasis in these cases.

In the sympathetic form of gonorrhœal orchitis just alluded to, in which the testicle is attacked, apparently without any previous affection of the vas deferens, the inflammation likewise commences generally in the epididymis. This form of the disease, though less common than the other, is by no means of unfrequent occurrence. Of one hundred and four cases of gonorrhœal orchitis noted by M. Aubry, in thirty-one the disease was sympathetic; in the remaining seventy-three, the inflammation first attacked the vas deferens. It is the opinion of many surgeons, that orchitis most frequently arises in cases in which the discharge has been somewhat suddenly arrested by cubebs or copaiba, or astringent injections.

More mischief is perhaps ascribed to these remedies than they can justly be said to produce. I have prescribed copaiba and cubebs separately or conjointly in all stages of gonorrhœa, and have not found the patients to whom they were exhibited more liable to be attacked with orchitis than others treated differently. With regard to injections, my own experience leads me to conclude that when employed of a proper strength they are very little liable to excite orchitis. It is only when used improperly, when too strong and injected too freely, so as to aggravate or too suddenly suppress the urethral inflammation, that they tend to produce inflammation in the testicle. According to my observation, orchitis most frequently arises in those cases in which the affection of the urethra is allowed to linger for want of a due exhibition of the remedies alluded to, particularly when the prostatic part of the canal is affected. Some pathologists have gone so far as to say that the chances of a swelled testicle are increased in direct ratio to the continuance of the disease in the urethra. Certainly most practitioners will allow that the occurrence of orchitis during the early and acute stage of gonorrhœa is comparatively rare.

In chronic gonorrhœa, stricture, and morbid states of the prostatic part of the urethra, the patients are liable, especially at night, to distressing and painful erections, accompanied with abnormal sexual excitement and seminal emissions. In these cases the testicle often feels heavy and uneasy, and tender on pressure; and in this irritable state is disposed to inflammatory action. Accordingly we find that slight circumstances, which would produce no ill effect at other times, then appear sufficient to excite orchitis. Slight blows or pressure, horse exercise, any excess in stimulating drinks, and neglect of the use of a suspender, are commonly sufficient to induce the disease. There can be no doubt that some persons are naturally more susceptible to attacks of orchitis than others. Thus there are many individuals who never contract a gonorrhœa without its being followed by inflammation of the testicle, notwithstanding every precaution taken to prevent the attack; whilst there are many others, who, though repeatedly affected with gonorrhœa, yet altogether escape an attack of orchitis. We do not find, too, that those who suffer most severely from gonorrhœa are the most liable to orchitis. The persons most susceptible of the disease are the scrofulous, and those of a weak

habit, who, though they suffer less in the first instance, find great difficulty in getting rid of the discharge, and more frequently experience relapses; whilst the robust, and persons of a naturally good and strong constitution, who, when they contract gonorrhœa, experience its effects in an acute form, sooner get rid of the disease, and more commonly escape its after-consequences, orchitis and stricture.

Consecutive orchitis is generally supposed to occur more frequently on the left side than on the right, but statistical inquiries show the fallacy of this opinion. Thus, in seventy-three cases of orchitis observed by M. Gaussail, in forty-five the disease was on the right side, and in twenty-four on the left; four were double. In twenty-nine cases of gonorrhœal orchitis, M. D'Espine found twelve on the right side, eleven on the left, and six double. I have registered only a few of the cases which have occurred in my practice. Of thirty-six cases of consecutive orchitis, twenty-one occurred on the right side, and fourteen on the left; one only was double. My observations, therefore, agree with those of the above writers in indicating the right testicle to be the one most frequently attacked. Taking the three series of observations together, we have 138 cases of orchitis; of these, the right testicle was the seat of disease in seventy-eight, the left in forty-nine, and both glands in eleven. In cases of orchitis arising from chronic disease in the urethra, both organs are more commonly attacked than appears from these statistics.

Symptoms.—A testicle attacked with acute inflammation in a few hours becomes swollen, hard, and tender, and feels heavy and painful. It increases to twice or nearly thrice its natural size, but without alteration in its oval form. The enlargement is attended with a sense of weight, which is a good deal increased in the erect posture. The pain is of a constant dull, aching description, and extends upwards to the loins, where it is often severe. It not unfrequently takes a reflex course, extending downwards to the hip, upper part of the thigh, and crista of the ilium, in the direction of the branches of the different lumbar nerves. As the disease advances, the swollen testicle becomes so tender that the patient can scarcely allow the part to be touched, and cannot bear even the contact of the thigh. The scrotum becomes injected, and is found red, hot, smooth, and slightly cedematous.

The constitutional symptoms vary a good deal, but are sometimes severe. The pulse is rapid and hard, the skin hot, and the tongue white and furred. The patient suffers often from nausea and occasionally from vomiting. After the acute symptoms have existed for a period varying from forty-eight hours to a week or more, they begin to disappear, subsiding more gradually and slowly than they set in. But the duration of the disease is much influenced by the activity of the means adopted for its removal, as well as by the constitution of the patient. In many persons, more particularly in those of feeble constitution or advanced in age, the inflammation soon assumes a subacute form. The swelling increases without producing much suffering, and afterwards subsides slowly; the disease being often obstinate and lingering, and subject to relapse.

Consecutive orchitis is usually preceded by uneasiness in the course of the vas deferens; the patient occasionally experiences distress and irritation about the bladder, and is troubled with a frequent desire to pass water, which is shortly followed by a dull aching pain and slight fulness in the groin. On examination of the spermatic cord, it feels full, and sometimes œdematous, and the vas deferens is found to be tender and enlarged. The thickening is sometimes so great, that the duct feels nearly as large as the little finger. The epididymis soon afterwards becomes swollen and painful: the tumefaction commences at the lower part or tail, and increases very rapidly. It forms an irregular elongated or crescentic swelling at the back of the testicle, which is fuller and larger than the gland itself, and extremely tender, whilst the body of the organ in front may often be pressed without causing uneasiness. The epididymis may remain affected for many hours, and even a day or two or longer, before the inflammation extends further; and if checked in time it may never reach the tunica vaginalis, or body of the gland. The tunica vaginalis, however, often becomes affected; and then so much tumefaction ensues that the inflamed mass forms a uniform tumor, in which the epididymis can scarcely be distinguished from the other parts; but fluctuation may generally be distinguished in the front part. In the sympathetic form of consecutive orchitis, the swelling of the epididymis takes place without the symptoms indicative of a previous affection of the vas deferens. There is much variety in the intensity of the symptoms. In some cases there is merely a slight dull pain, with little

enlargement, and scarcely any constitutional disturbance. Sometimes the swelling is from the first very considerable, the volume of the gland becoming three or four times larger than natural, the pain being acute and constant, and the symptomatic fever severe. In other cases the swelling, though considerable, is quite indolent, and its progress slow and of long duration. But, in general, the symptoms continue to increase in intensity for several days till about the seventh or eighth, when they begin to disappear, the febrile disturbance and pain entirely subsiding, and shortly afterwards the tumefaction. As the swelling diminishes, the epididymis becomes distinct, forming an indurated, knotty, and irregular swelling, at the back part of the testicle, which often lasts for many months, and in some instances never disappears entirely during the remainder of the patient's life. In fifteen cases observed by M. D'Espine which were cured, the mean duration of the disease was thirty-three days and a half. This closely accords with the observations of M. Gaussail, who found the mean duration of seventy-three cases to vary from thirty to thirty-five days; but in my experience it much exceeds the period usually occupied by acute orchitis under suitable treatment. The cure of the disease is liable to be interrupted and its duration prolonged by relapses, which are readily induced by any neglect or imprudence.

A testicle which has been attacked with inflammation is afterwards more liable to orchitis than before. The gland, too, sometimes remains more sensitive; feels uneasy under gentle pressure, or when the patient gets out of health; and sometimes becomes painful and swollen from slight causes.

Acute orchitis occurs occasionally in young infants. The symptoms are acute, and the swelling considerable; but the inflammation soon subsides, and is generally confined to one testicle.—A Jew child, only five months old, was brought to me at the London Hospital on account of a swelling in the left groin and scrotum. The mother first observed it the day before on washing the child: he afterwards cried the greater part of the night. The tumor extended from the external ring to the bottom of the scrotum, was full six times the size of the right testicle, felt firm and hard, and received no impulse when the child cried or struggled. The scrotum was distended, and very red and hot. I ordered the application of a leech and cold lotion, and two drachms of castor oil to be given.

In two days I found the swelling reduced about one-third, and much less tender; and the infant appeared free from suffering. I directed four grains of the *hydrarg. cum cretâ* to be given every night. Under this treatment the swelling and induration soon subsided, and in a week the gland was nearly reduced to the size of the right testicle, but the cord still remained thickened and hard. Three weeks after the attack first commenced, I found the parts perfectly natural.—In 1842 I was requested to see in consultation a little boy, two years of age, who, on recovering from an inflammatory attack of the chest and head, was seized with an affection of the testicle. It appeared that, before his illness, there was a small hydrocele on the right side. A few days previous to my visit the scrotum became red, tender, and oedematous. I found a swelling of the right testicle nearly the size of a hen's egg, which fluctuated in front, felt solid at the back part, and was hot and very tender. I considered this to be a case of acute inflammation of the tunica vaginalis and testicle. The child was weak, irritable, and emaciated, and had recently taken mercury to some extent. I ordered a leech to the scrotum, the parts to be frequently fomented and well supported, and the child to be kept in the recumbent position. I saw him again at the end of a week. The tunica vaginalis had suppurated, and burst through the scrotum in front, and had discharged a quantity of thick matter. The swelling was much reduced in size; but the testicle as well as the cord was still enlarged and indurated. A small quantity of matter continued to be discharged. He was ordered quinine and a nourishing diet; and a month afterwards I was informed that the opening had closed, and that the boy was restored to health, slight induration only remaining at the back part of the gland. I have seen several cases of a similar kind.

Diagnosis.—No difficulty is experienced in distinguishing a testicle swollen from inflammation from a strangulated inguinal hernia. In both, there may be a scrotal swelling, accompanied with pain and tenderness of the abdomen, vomiting, obstinate constipation, and a good deal of constitutional disturbance. The true nature of the case, when these symptoms exist, can always be ascertained very readily by the absence of tension in the abdomen; the limitation of the pain and tenderness to one side; inability to feel the testicle of its natural size below the swelling (supposing the hernia not

to be congenital, and if so the history of the case would set all doubts at rest); and by the tumor when handled being found harder, more solid, and more painful than a hernial swelling, and, unless there is much swelling of the spermatic cord, being clearly defined at its upper part. When a testicle detained in the groin becomes inflamed, the diagnosis is much more difficult, a tense inguinal swelling being coupled with sickness, pain in the abdomen, and sometimes constipation. The empty state of the scrotum would always be sufficient to excite suspicion, and an active purge to set all doubts at rest. The active character of the symptoms renders acute orchitis unlikely to be mistaken for the more chronic diseases of the gland.

Secondary orchitis differs from inflammation of the body of the testicle in being preceded generally by swelling, and tenderness of the spermatic cord and in the course of the vas deferens; in the epididymis being invariably the part of the organ first affected; in the more rapid formation and greater size of the swelling; in the disease being of a more chronic character, and in the pain and constitutional suffering being less severe. It rarely leads to suppuration, disorganization, or atrophy of the gland, but often leaves the epididymis enlarged and indurated.

Treatment.—Acute orchitis must be treated with antiphlogistic remedies, the activity of the means being proportioned to the intensity of the inflammatory action and the constitution of the patient. In the gonorrhœal form of the affection, all means which may have been resorted to in order to arrest the discharge must be abandoned. In cases in which it can be managed without inconvenience, I usually direct the patient at the onset to maintain the recumbent position, either on a sofa or in bed; and in very acute cases I even elevate the pelvis by a pillow placed under the nates. The scrotum and its contents must also be well supported in a suspender. The parts may be effectually sustained in a silk, or, better still, a cambric handkerchief, doubled so as to form a triangle, the middle of the base, to which a piece of double tape has been sewn, being applied to the perineum, and the extremities of the handkerchief carried forwards and attached in front to a band round the waist, whilst the ends of the tape being secured to the band behind prevent the handkerchief slipping forwards. Patients suppose that the recumbent position obviates the necessity for support; but this

is a mistake, the effects of gravitation being further counteracted, and much relief afforded by raising the testicle from its position upon or between the thighs. In the majority of cases of gonorrhœal orchitis patients do not find it convenient to lay up, and are content with the relief afforded by a suspender, which in mild cases proves sufficient. The patient's diet must be restricted, and the bowels gently purged. Acute orchitis, if treated quite early with nauseating doses of tartar emetic, usually subsides rapidly, so that this plan renders local depletion unnecessary; and as the depressing influence of the remedy is only temporary, the patient quickly regains his health and strength. I have seen very acute orchitis arrested and subdued in thirty hours by keeping up constant nausea with antimony. I usually prescribe the tartar emetic in a camphor mixture, with small doses of sulphate of magnesia and tincture of henbane. The pain and constitutional derangement are much relieved by two or three grains of calomel combined with eight or ten grains of Dover's powder, or with half a grain of morphia taken at bed-time. In both forms of acute orchitis considerable benefit is derived from mercury. After the bowels have been fully acted on, and the pulse lowered by antimony, mercury may be given, and continued until the gums become slightly affected. I am confident that by this treatment the duration of the disease is materially abridged, and, what is of no little importance, it is succeeded by much less induration and thickening of the epididymis, and less risk of a permanent obstruction of the excretory duct than when mercury has been deferred to a later period.

In the treatment of orchitis in private practice it is generally desirable to avoid local bloodletting, but in cases of a severe or obstinate character, depletion sometimes becomes necessary. From six to twelve leeches, according to the circumstances of the case, are to be applied, and if no relief be experienced in from twelve to sixteen hours, they can be repeated. I usually direct the leeches to be applied in the course of the cord just above the inflamed testicle, the parts being previously shaved. The leech-bites are followed by less irritation in this situation than in the lower part of the scrotum. The flow of blood may be encouraged, after the removal of the leeches, by a warm hip-bath or a light poultice. In consequence of the mess produced by leeches and the itching and soreness of the leech-bites afterwards, many surgeons prefer the abstraction of blood from the

veins of the scrotum. The patient should be directed to stand up and foment the scrotum for a few minutes with warm water. Three or four of the distended veins are then to be punctured with a lancet. After enough blood has been withdrawn, the patient must lie down and raise the scrotum, when the bleeding in general immediately ceases. If blood should still flow, it may be readily arrested by attaching to the wounded parts the small suture forceps. Local venesection usually answers well enough, though in some instances the blood has not flowed with readiness, and I have even failed in removing a sufficient quantity. The scrotum is not always tense and distended, nor are the veins always apparent and prominent.

The local application most generally applicable to the inflamed testicle, is a piece of lint dipped in warm water, or an infusion of poppy-heads, covered with oiled silk to keep it moist. This promotes the action of the skin, and is a grateful and soothing application. Cold lotions are not generally convenient. They can only be used with effect whilst the patient remains at rest in bed with the clothes kept from the parts. In severe cases of acute orchitis, both consequent on injuries and occurring idiopathically, in which the pain was considerable and the constitutional disturbance great, I have had recourse to the local application of ice with marked benefit. The plan of proceeding is to keep the patient in bed, with the testicle well supported by a handkerchief in the way already described, or, what is better, by a crutch-pad applied transversely beneath the testicles, the piece of bandage attached to each end of the pad being passed above the crest of the ilium and secured around the body. The ice is to be applied to the testicle by enclosing it in a small bladder or in an india-rubber bag with a somewhat narrow neck, the cold being sedulously maintained by frequent renewal of the ice. The patient should be provided with two bladders or bags, one to take the place of the other as the ice melts. The effects of the application are remarkable. The scrotum becomes blanched, shrunk, and corrugated; the pain and heat are entirely removed, and in a few hours the enlargement of the gland is found much diminished. The advantages of this treatment consists in the early and complete relief of the pain from the benumbing effects of the cold; in its decided antiphlogistic influence, arising both from the reduction in temperature and the even and steady compression of the testicle by the strong tonic contraction of the dartos; and in

the saving of the patient's strength by the avoidance of all depletory measures, the only other treatment required during the acute stage being restriction in diet and a purge. The efficacy of this plan of treatment, however, much depends on its early application, and steady continuance for a period of from twenty-four to fifty-two hours. After orchitis has existed a day or two, the application of ice does not appear to answer.

The cure of orchitis has been facilitated by the application of a mode of treatment which has been found of great service in relieving certain forms of inflammation in other parts of the body, viz. *compression*. The object of compression is to afford support to the weakened vessels; and in inflammation of the integuments, when properly applied for this purpose, and not so firmly as to produce pressure and arrest the circulation, it often proves a very valuable method of treatment. Dr. Fricke, of Hamburgh, first suggested the practice of treating both acute and chronic orchitis by compression, applied to the testicle by means of adhesive plaster. In an early report of this practice, he states that out of fifty-one cases of acute orchitis eighteen were treated by the ordinary means, and thirty-three by compression. In the latter cases the average duration of the disease was nine days, whilst in the former it was thirteen. In cases treated more recently, after improvements had been made in the mode of applying the compression, the result was still more favorable.¹ This practice has since been extensively adopted both in this country and on the continent. Some care is required in making the application, which I perform as follows. The patient being placed in the recumbent position, with the testicle raised, is to remain there three or four minutes, in order to allow the vessels of the gland to become as empty as possible. The parts are to be shaved; and some adhesive plaster on chamois leather must be cut into strips, about three-quarters of an inch in width, and eight or nine inches in length. The opposite testicle and side of the scrotum being drawn away from the diseased one, so as to render the integuments of the latter quite tense, the first strap is to be placed circularly round the cord, just above the testicle, as tightly as the patient can bear it. A strip of lint may be placed beneath the edge of

¹ *Zeitschrift für die Gesamnte Medicin*, as quoted in the *Gazette Médicale de Paris*, année 1836, p. 182.

the plaster to prevent its irritating the scrotum. The second strap is to be placed in an opposite direction, from behind forwards, at the side of the testicle near the septum. The third strap is to be applied below the first, so as partly to overlap it; and the fourth in like manner, internal to the second; and so on in succession, until the straps meet, and the whole of the testicle is covered, and evenly compressed. A few additional straps may afterwards be applied where most needed to afford support, and keep the others in place; the parts are afterwards to be supported in a suspensory bandage. The strapping generally requires to be reapplied in the course of twenty-four hours. When the patient rises after its application, he feels relieved from the aching pain and sense of weight. The application of compression has been recommended at the onset of the inflammatory attack, but in acute orchitis it is better to commence with antimony, ice, or depletion, and to have recourse to strapping when the active symptoms are yielding. At this period compression well applied often greatly facilitates the cure, promoting the rapid subsidence of swelling and the removal of plastic exudation, and of the thickening of the epididymis. This may be further promoted by small doses of mercury, or by the iodide of potassium. When there is much effusion in the vaginal sac, strapping the tumor does not seem to act with much effect. In these cases, and also when it is inconvenient to renew the strapping, which usually soon gets loose, counter-irritation may be kept up by painting the scrotum over the affected testicle with the tincture of iodine, repeating the application every third or fourth day, until the gland is restored to its healthy state.

It has been attempted recently, in cases of orchitis, to obtain the same effect as that produced by strapping, by coating the scrotum with collodion. This application has been used chiefly by the French surgeons, some of whom have reported favorably of it. I have tried it in several cases, but have not found it answer. Collodion, when applied to the scrotum, causes a certain amount of contraction, the effects of which are exerted chiefly on the skin and subcutaneous connective tissue; but its compressing influence on

Fig. 30.



the inflamed gland is extremely feeble. Besides, it is very liable to produce considerable irritation, and even sores on the scrotum, which are very annoying to the patient. On this account, elastic collodion, a mixture of this substance with castor oil, has been employed. This I have also used. It certainly produces less irritation than ordinary collodion, but, on the other hand, has less constringent power.

Many ingenious attempts have been made to construct an apparatus capable of producing equable compression of the testicle. Amongst others, Mr. Hutchinson has invented a caoutchouc bag, the cavity of which may be lessened to any amount by inflation of its walls. By the agency of this contrivance permanent and equable compression may be exerted on the testicle without the necessity of removing the instrument. An inconvenience of this apparatus arises from the confinement of the perspiration, causing moisture on the surface of the skin and a sense of heat. It is well adapted, however, to produce compression when we wish to combine local applications with this treatment, which cannot well be effected with strapping over lint and mercurial or iodine ointments.

In some constitutions, after the more active symptoms of orchitis have subsided the inflammatory action persists, and continues in a subdued and chronic form. This is observed in persons of a weak frame, who appear pale, and as if they did not habitually enjoy good health. In these subjects the orchitis even at the onset is often neither acute, nor accompanied with any marked constitutional disturbance. Neither depletion nor the application of ice makes much impression on the inflamed testicle, which continues swollen and tender, whilst the loss of blood renders the patient weak and irritable, and retards his recovery. In these cases of subacute orchitis the diet should be nourishing, but not stimulating. Three or four grains of blue pill, combined with the same quantity of the extract of henbane; or five grains of the *hydrargyrum cum cretâ* and of the *pulvis ipecacuanhæ comp.*, may be given night and morning. In some cases I have found much benefit result from the decoction of bark or of sarsaparilla with the sixteenth of a grain of the bichloride of mercury taken three times a day. The diseased testicle should be carefully strapped; but in those cases in which the enlargement of the epididymis is accompanied with effusion in the vaginal sac, the scrotum should be painted with the

tincture of iodine until the fluid is absorbed, when compression may be applied with advantage.

The advice given by Bromfield and other surgeons of his day in cases of gonorrhoeal orchitis, to introduce a bougie into the urethra, or to inoculate it afresh in order to bring back the discharge, was founded on the erroneous idea, that the acute symptoms of orchitis are never dissipated till the return of the discharge from the urethra. These are absurdities which the common sense of modern surgeons has completely banished from practice. Copaiba, cubebs, and remedies of this class, as well as injections, must not, however, be employed so long as any active disease is going on in the testicle; and even after the symptoms of inflammation have disappeared, they must be used with caution and in moderation. Though I have rarely found them give rise to orchitis, I have known them, when injudiciously used, produce a relapse after all inflammation had ceased. In 1811, Mr. Ramsden published some observations,¹ to show that chronic enlargement and induration of the testicle, to which he applied the term *sclerocoele*, were dependent on some affection of the urethra, and that they were to be cured by remedies directed to correct the diseased condition of the canal. His views never made much impression on the profession. He was wrong in regarding the disease in the urethra as the invariable cause of the affection of the testicle, instead of an occasional one; but he committed a greater error in practice by chiefly applying his remedies to the part supposed to be the original source of irritation, instead of the actual seat of disease, and in considering the use of the bougie an essential part of the treatment of these cases. Mr. Ramsden's observations, however, were useful in directing attention to the frequency of the connection between morbid states of the urethra and testicle, which exists more commonly than was supposed. In cases of stricture, it often happens after an attack of acute orchitis that the epididymis continues for several weeks, and even months, tender and enlarged, and the cause of annoyance to the patient, owing to a low degree of inflammation still lurking in the part. In several of these cases, after the stricture has been cured by instruments, the affection of the testicle has subsided without any other treatment being necessary than simply supporting

¹ Practical Observations on the Sclerocoele and other Morbid Enlargements of the Testicle, &c.

the organ. I believe, too, that in the majority of cases in which the inflammation of the testicle exhibits a tendency to return, or in which relapses occur, there is some disease or source of irritation in the urethra. In the treatment, therefore, of consecutive orchitis of an indolent or obstinate character, it is often prudent to pass a bougie in order to ascertain the state of this passage.

When suppuration occurs, the scrotum must be fomented and covered with a poultice or the simple water-dressing; and as soon as matter can be detected by fluctuation, a lancet is to be introduced and the pus discharged, in order to obviate the sinuses and fistulous passages liable to be occasioned by the confinement of matter within the tunics. In consecutive inflammation the small isolated collections of serum often formed between the adhesions of the tunica vaginalis, which fluctuate distinctly, and sometimes evince little disposition to disappear, are apt to be mistaken for deposits of pus. When any doubt exists, a grooved needle can be introduced to remove it. The opening made for the escape of matter should not be allowed to close too soon.

I have not considered it necessary to draw any distinction in the treatment of primary and of consecutive orchitis, the same general principles being applicable to both forms of the disease. But the pathological distinction which has been observed is not without practical interest, and should not be lost sight of in the treatment of these cases. As inflammation originating in the body of the testicle is of a more destructive character and more injurious to the organ than that commencing in the epididymis, and as the pain and constitutional derangement are greater in the former, as a general rule the treatment of primary orchitis should be more active than that of consecutive, and this form of the disease more generally requires local depletion. The prognosis in consecutive orchitis is more favorable than in primary: on the other hand, after inflammation has ceased, consecutive orchitis is more exposed to relapses, and the swelling and induration accompanying it subside less readily and quickly than in primary orchitis.

I have already noticed (Chapter I, Section III) the liability of a testicle detained in the groin to be attacked with inflammation, and of the tumor to be mistaken for a strangulated hernia or a bubo. It is only necessary to add that a case of the kind should be treated actively, to prevent the inflammatory action extending to the peritoneum, and giving rise to dangerous symptoms.

SECTION II.

CHRONIC ORCHITIS.

The testicle is liable to a form of inflammatory swelling of a distinct and chronic character, which occasionally succeeds acute orchitis, but far more commonly arises spontaneously. The disease is of importance; for, if unchecked, it tends to disorganize and destroy the gland.

The chief anatomical character of this form of orchitis is the exudation of a peculiar yellow homogeneous substance in the body of the testicle. This substance when first formed is of somewhat soft consistence, but afterwards becomes firm and solid, and so closely adherent and intimately blended with the proper structure of the organ, as not to admit of separation without much difficulty. In general there is a single deposit of this substance in the centre of the glandular structure, as in the preparation from which the annexed woodcut was taken. In a case of chronic enlargement of both testicles taken from a patient who died of *ramollissement* of the medulla spinalis, I found six or seven separate deposits of this yellow matter in the substance of the right testicle, and a single one only in the body of the left. The presence of several separate deposits, however, is by no means a common occurrence. The small masses as they enlarge coalesce, or the single one increases, until the whole testicle presents a uniform yellowish-white appearance. I have never succeeded in injecting this deposit or tracing vessels into it. The vessels of the testicle generally are enlarged. When chronic orchitis is preceded by epididymitis, this part is found thickened and enlarged from adventitious deposit between the ducts. The epididymis, however, is most generally unaffected. There is often effusion of serum within the cavity of the tunica vaginalis, seldom amounting to more than two or three ounces, and sometimes also an exudation of lymph. The sac may even be partially or totally obliterated by adhesions.

Fig. 31.



On a minute examination of testicles affected with this disease, it appears that the deposit consists principally of a substance exuded in the connective tissue between the tubuli. This substance is a tenacious lymph with a fibrillated basis, in which corpuscles are either wanting or very sparingly present. The tubuli are also filled with a darkish yellow matter, of a friable character, containing abundance of corpuscles, and resembling scrofulous matter. In the vicinity of the chief mass of the deposit the walls of the tubes were found in some instances thickened, and their cavities distended by the matter within, but there were no local dilatations. Some of the tubes were found slit up lengthways, the matter within the tubes thus becoming mingled with the intra-tubular substance. In a specimen of old-standing disease many of the tubes were found degenerating and becoming fibrous, their tubular character ceasing, and their extremities being mingled with the fibrillated deposit in the body of the organ.¹

It thus appears that two distinct products are observed in this disease;—one effused between the tubes and of a fibrinous character, the other intra-tubular, mainly corpuscular, and resembling scrofulous matter. Chronic orchitis, however, is of a very different nature from tubercle, and as the two diseases have been often confounded, and require very different treatment, it is most important to recognize the pathological distinction. The tubules are not observed to be irregularly dilated as in tubercle (*vide* p. 253); but, what is more marked and more important, no softening process ensues in the morbid product; and instead of its being diffused, and occurring especially in the epididymis, like tubercle, it is formed in the body of the gland, and, however largely developed, occurs generally in a single or isolated mass. In tracing the progress of the disease we shall find that it rarely occurs in early life; that if allowed to proceed unchecked, it does not commonly, like tubercle, break up and disintegrate the tubules or give rise to abscess, but leads rather to their wasting from the outside pressure of the lymph and interference with nutrition, or to their fibrous degeneration. And here it becomes a question of no slight interest to determine, whether the two products, the intra-tubular and corpuscular, and the extra-tubular and fibrinous, are

¹ These observations have been limited, the curable nature of the disease having prevented my obtaining many specimens, especially recent.

merely modifications of one and the same exudation; whether, in fact, the exudation which assumes a fibrinous character between the tubes becomes so changed in its passage through them as to lose its tendency to fibrillate, and acquires that of becoming corpuscular; or whether, as seems to me more probable, the two products are different, the one being purely lymphatic and prior in point of time, the other developed in the tubes as the result of a disturbance in their nutrition, being really of a scrofulous character, but differing from ordinary scrofulous matter in that it springs from purely local and not from constitutional conditions.

The yellow substance exuded in chronic orchitis is sometimes called the *yellow tubercle of the testicle*, but as the disease differs from scrofula in several essential points, and cannot be regarded as the local manifestation of tuberculosis, the term is an objectionable one, and liable to lead to error. This yellow matter under appropriate treatment undergoes complete absorption, the testicle being left in a condition to perform its natural functions. It sometimes happens, however, that ulceration ensues in its tunics and integuments, and that a fungous-looking growth gradually protrudes through the opening which is thus formed. This fungous growth, properly termed *benign*, is sometimes called *granular swelling*; it has also received the name of *hernia testis*, being formed in a manner very analogous to that of a *hernia cerebri*, in which the substance of the brain is protruded through an ulcerated opening in the dura mater. It appears that the yellow deposit after some time excites ulceration in some part of the tunica albuginea. The tunica vaginalis, and afterwards the skin, become adherent at this spot, and likewise inflame and ulcerate. The resistance afforded by the dense unyielding tunica albuginea being thus removed, the adventitious deposit gradually presses out the tubular structure, which forms a projecting tumor consisting of the tubuli mixed up with this yellow substance, and also of ordinary granulations. The mass often projects so much that scarcely any part of the organ is contained within the integuments, the tunica albuginea being partially everted, and the scrotum, relieved from tension, being retracted all round the opening by the action of the dartos.

It can be clearly shown by dissection and microscopic examination that the projecting fungous mass when of large size is composed of the tubules of the testicle and of lymph interspersed amongst

them, together with ordinary granulations springing from those tubes which are near the surface. The smaller fungous growths consist simply of the gland-tissue extruded from the everted tunica albuginea, protected or coated on the surface with prominent granulations of lymph. In Fig. 32, taken from a preparation in the London Hospital College, and representing a section of a benign

Fig. 32.



Section of a benign fungus:—A, the projecting fungus; B, B, scrotum; C, C, everted tunica albuginea.

fungus, nearly the whole of the glandular structure of the testicle is seen to be exterior to the scrotum, the mediastinum testis being above the level of the integuments. In minute examinations of these fungous growths I have rarely found any great amount of exuded matter. The ulceration of the coats of the testicle, and consequent protrusion, appear to have beneficial influence as respects the nutritive condition of the glandular structure. The tubuli and bloodvessels are relieved from the injurious effects of compression, the circulation is re-established, and, in many instances, the exuded lymph undergoes absorption, and the morbid product disappears from the interior of the tubes. The tunica albuginea is commonly thickened around the margin of the opening, the edges of which are everted. The margin of the scrotal integument immediately around the fungus in old cases is generally indurated and thickened, and is sometimes also slightly undermined.

It is only in recent years that this hernial protrusion, or benign fungus of the testicle, has attracted particular attention. In 1808, Mr. Lawrence explained its true nature in a paper illustrated with several cases;¹ and his observations on its causes, symptoms, and progress have been confirmed by all succeeding writers on the diseases of the testicle.² Though the benign fungus occurs most fre-

¹ Edinb. Medical and Surgical Journal, vol. iv, p. 257.

² In 1852 this affection was the subject of an animated and protracted discussion in the Academy of Medicine of Paris. The discussion arose on the reading of a memoir on the treatment of tuberculous ulcers of the testicle by M. Malgaigne, who described a special fungus connected with tubercular fistulae which required excision. I cannot recognize any such growth in tubercular disease of the organ. The lymph which

quently as a chronic change in this form of orchitis, it is occasionally the result of acute inflammation supervening upon the chronic disease, and terminating in suppuration in the substance of the gland. In a case of this kind, in addition to the glandular swelling, there are sinuses more or less numerous which burrow in the interior of the testicle, and discharge pus mingled with the yellow matter. An attack of orchitis originally acute, going on to suppuration, is also liable to be followed by a fungous protrusion of the secreting structure of the gland. In the latter case the growth is not so exuberant, owing to the absence of the yellow exudation matter; but there are generally sinuses which furnish a purulent discharge, sometimes mixed with semen.

A testicle, after becoming somewhat enlarged from chronic inflammation, often continues indolent and stationary for years, giving rise to very little inconvenience. On examining the organ in this state, the yellow adventitious deposit is found to possess considerable firmness and consistency; the tunica albuginea is thickened, and in some places as dense and indurated as cartilage; and the surfaces of the tunica vaginalis are closely connected by old adhesions. The glandular structure is atrophied by the pressure of the yellow matter; and after some time both become converted into fibrous tissue or undergo a slow process of wasting, so that an enlarged and indurated gland is progressively reduced, until scarcely anything remains beyond a mere nodule of fibrous tissue of the size of a nut at which the spermatic cord terminates. I found, on examination of the body of a man who some few years previously had suffered from chronic inflammation of the testicles, both glands much indurated, but about the natural size. In both the tubular structure was very deficient, its place being supplied by a dense fibrous tissue. At the upper part of the right gland there was a yellowish deposit almost as dense as cartilage, and exhibiting very little trace of vascularity. A testicle in this indolent state, when examined in the hand, often feels as hard nearly as a stone; and formerly the term *scirrhus* was applied to such

tends to force out the tubuli in chronic orchitis after the coats of the testicle have ulcerated, is formed in the connective tissue outside the ducts, and does not therefore readily destroy them, and is, moreover, confined generally to the body of the testicle. But tubercles are developed, as I shall hereafter show, within the tubes, and more commonly affect the epididymis than the body of the gland, both the secretory and excretory apparatus being more or less destroyed.

enlargements. In these indurated testicles, the epididymis often escapes the morbid alteration affecting the body of the gland; in other cases, however, the epididymis is also found nodose, irregular, and hard.

It will be perceived, from the preceding observations, that the tendency of this chronic disease is gradually to destroy the integrity of the testicle. If the inflammation be checked in an early stage, the gland is left unimpaired; if its course be not arrested until a later period, the secreting structure is partly disorganized and reduced in size; but if the disease be allowed to continue unchecked by treatment, the organ is totally destroyed, either by suppuration and ulceration, or by the slower process of wasting and fibrous degeneration. When both testicles are attacked the sexual desires and powers decline in proportion to the damage resulting from the disease.

The causes of chronic inflammation of the testicle are various. It often takes place after a slight contusion, the first effects of which were so inconsiderable as to be very little regarded by the patient, the testicle not beginning to swell nor to give pain till some weeks after the accident. Occasionally it arises a short time after the cessation of an attack of acute orchitis, more particularly when the patient has been guilty of some imprudence in drinking or sexual indulgence. Persons suffering from stricture, and other affections of the urinary organs causing irritation in the urethra, are peculiarly liable to it; and the inflammation, though usually idiopathic, may sometimes be traced creeping along the vas deferens to the epididymis, and thence to the testicle, as in consecutive orchitis. It occasionally arises during an attack of gout, and in persons suffering from rheumatism, in which cases it has partaken of the characters of these constitutional maladies. Sir A. Cooper took a just view of the disease in considering it to be mainly dependent on impaired health and a feeble constitution. He remarks, "With respect to the causes of this disease, it is wrong to view it merely as a local affection; for there is in persons prone to this complaint a constitutional tendency to the malady. It often occurs in those who have been scrofulous in their youth. It is frequently the product of a constitution worn and broken by intemperance. It often follows a long-continued course of mercury; and it arises in habits in which the vital powers are diminished, and in which we

so often find sloughing of the cellular membrane, in the form of chronic carbuncle. Frequent exposure to wet, cold, or fatigue, and an excessive indulgence of the passions, also dispose to its production. The most frequent occasional cause is urethral disease, whether it be irritation only, exciting a sympathetic influence, or an organic change in the mucous membrane; and many of those causes which I have mentioned, in speaking of acute inflammation of the testes, are, in different cases, the precursors of this disease; the chief difference in the nature and production of the two complaints being in the state of the constitution.”¹

Symptoms.—The symptoms of this disease are uniformly of an indolent character. At the commencement the testicle feels somewhat tender; and after a short time the patient detects a slight enlargement, and an irregular induration in some part of the organ. This induration often commences at the lower part of the epididymis; but not always, nor so frequently as is supposed by many pathologists. The body of the gland and the epididymis shortly become involved in one common swelling, which feels smooth, firm, inelastic, and of uniform consistence, and is of an oval form, with the sides somewhat flattened. The enlargement advances slowly, but goes on steadily increasing until the organ is at least twice its natural size. The swelling is attended with slight pain of an obtuse character, and a sense of weight in the part and in the loins. The pain on pressure is also dull; and when the disease continues for seven or eight weeks or longer, the organ loses in a great degree its peculiar sensibility. The spermatic cord is not generally indurated; but it feels full, and its veins are rather swollen. The term *sarcocoele* was applied formerly to this state of the testicle, as well as to other enlargements of the gland of a very different nature. The confusion thus produced led to the disuse of this term, which is now seldom met with in surgical works. There is often some effusion in the vaginal sac around the enlarged testicle, constituting the affection to which the term *hydrosarcocoele* was applied. The effusion is seldom considerable; indeed I have rarely found it exceed two or three ounces. It is frequently collected at one spot, its diffusion throughout the sac being prevented by adhesions.

It occasionally happens that both testicles become affected, inflammation having commenced in one gland shortly after the enlarge-

¹ Lib. cit. p. 39.

ment of the other, or, having ceased in one, then appearing in the other. Sometimes fluid is effused only on one side; in other cases there is double hydrocele, coupled with morbid enlargement of both testicles.

So little inconvenience is usually experienced from this disease, that the testicle sometimes acquires a considerable size before the patient's attention is seriously attracted to it. He finds relief, perhaps, from a suspensory bandage, and continues his usual occupations, exercise, and mode of living, without paying any further attention to it, until fresh inflammation is excited by a slight blow, or excess in drinking or venery; when, the symptoms becoming suddenly severe or increased, he is induced to seek for surgical assistance.

After the disease has existed for many weeks, or even months, the skin at some part of the scrotum, usually the front, grows thin and prominent, and becomes red and inflamed. In a short time it breaks, and a fungous-looking substance, and sometimes a small quantity of pus, are discharged; and this is soon followed by a protrusion of the substance of the testicle, which gradually increases, until the part presents the characteristic appearance of the benign fungus. This consists of a protuberant mass, presenting an ash or yellowish-white appearance, varied by irregular patches of a pale red hue, and sometimes of black, from inspissated blood. As on other granulating surfaces the eminences are more or less prominent, but in some instances are quite indistinct, the surface of the tumor being even and smooth. The projecting growth is surrounded

Fig. 33.



and often closely girt by the skin of the scrotum, the ulcerated edges of which are thickened and everted. It furnishes a scanty thin sanious discharge, occasionally mixed with the seminal fluid. It is nearly insensible to friction, the action of caustics, and incisions with the knife. The spermatic cord may be distinctly traced to the base of this morbid protrusion of the gland, which often projects so much that scarcely any part of the organ

can fairly be said to be contained within the scrotum. The disease in this stage is very indolent, and if not interfered with lasts many

months without undergoing any perceptible change. As soon as the scrotum has thus given way all pain abates, and the scrotal swelling partly subsides. Though chronic orchitis not unfrequently affects both testicles, the benign fungus has been rarely observed in both organs at the same time. I have met with it in only one instance. Mr. Lawrence, in his original memoir, describes two cases in which the organs were successively attacked with chronic enlargement followed by granular swelling. Very few cases of this affection have fallen under my notice within the last few years. The disease appears to reach this stage less commonly in the present day than was the case formerly, owing, without doubt, to the profession generally having become better informed in the diseases of the testicles, and to the success attending their improved treatment of them in the early stage.

I have spoken at p. 202 of the deposition of matter in the substance of the testicle and epididymis in cases of acute orchitis, and have mentioned the concrete form of this deposit, and chronic state of the symptoms which occur after all active disease has subsided. Suppuration occasionally takes place in the chronic form of orchitis, which I am now describing, in connection with the yellow fibrinous exudation matter, and in a case of the kind pus-corpuscles were found within the tubuli. Both pus and plastic matter may be effused in the substance of the testicle; or lymph may be deposited in the testicle, whilst suppuration occurs in the epididymis alone. The formation of pus in these cases is a serious aggravation of the disease, and much lessens our prospect of being able to save the testicle. When effused in the body of the gland it disorganizes the delicate structure; and when ulceration ensues and the matter escapes, leaves behind sinuses communicating with the interior of the organ, which evince but little disposition to close. These sinuses discharge a thin pus, mixed in some cases with the seminal fluid, forming consequently a *spermatic fistula*.

Sir A. Cooper has remarked that the testicle, even in very young children, sometimes becomes enlarged and very hard, but without pain or any inconvenience; and the disease is accidentally discovered by the parent or servant. In this state of indolent increase it remains for many weeks, months, or years; and then, under improvement of the general health, the enlargement subsides, and the

gland resumes its natural state.' Some years ago my late colleague, Mr. Hamilton, showed me an infant ten months old, who was under his care at the London Hospital on account of a chronic enlargement of both testicles. These glands were observed to be rather large at birth, but they had since greatly increased in size. The right was nearly as large as a plover's egg; the left was somewhat smaller. They were of an oval shape, and quite hard, had a smooth and even surface, and did not appear at all tender when handled. The infant was in pretty good health. The case had been under observation three weeks, during which time they had remained stationary. I have since seen two or three similar cases, but have had no opportunity of ascertaining the pathological nature of this chronic enlargement of the testicle in young infants. I believe Sir A. Cooper to have been in error in describing the disease as tubercular. The fact that the enlarged gland usually resumes its natural state, the even character of the swelling, and the absence of scrofula in other parts, are unfavorable to this view of the nature of the tumor.

I had not met with any case in which the disease had given rise to the benign fungus at this early period of life until the summer of 1854, when, being in Dublin, I was shown by Dr. Fleming, surgeon of the Richmond Hospital, a well-marked case of granular swelling in a child about two years of age, and also the drawing of the scrotum of another child with a similar affection. In a communication with which I have very recently been favored, Dr. Fleming informs me that he has met with several cases of chronic orchitis, both single and double, in different stages, in children applying for relief at the Netterville Institution. The drawing above alluded to was taken from a child, aged twenty months, born of healthy parents, who was seized with chronic orchitis first in the left testicle, and afterwards in the right. This occurred about six weeks or two months before application was made for relief. At this time, the local signs of the double disease were as graphically marked as in the best selected case of the adult, and the enlarged left testicle bulged forwards through an ulcerated opening in the scrotum and presented the peculiar appearances of the granular swelling. The right side of the scrotum was faintly tinged with red, oedematous, and at one part adherent to the testicle. During the stay of this

¹ Lib. cit. p. 97.

child in hospital the curative process proceeded favorably under the usual treatment, but the child was removed before the cure was completed. Dr. Fleming mentions two other cases of benign fungus, in children about three years of age, one testicle only being affected. In none of the cases which have fallen under his notice has he been able to trace the disease to any syphilitic taint in either of the parents. The treatment adopted was alterative doses of the gray powder combined with rhubarb and carbonate of soda, followed by iodide of potassium in syrup of bark and sarsaparilla, or the iodide of iron. The sulphate of copper and strapping were used locally. This treatment proved very successful.

Diagnosis.—An enlargement of the testicle from chronic orchitis may be mistaken for encephaloid cancer of the organ, and for a hæmatocoele. It differs from the former in the surface of the gland being more uniform and regular, in the tumor being of less size, and in the absence of any concomitant affection of the cord and lymphatic glands in the groin. In some cases the origin of the disease in the epididymis also serves to indicate the nature of the case. In the early stage, however, of encephaloid cancer, the characters of the tumor are so similar to those of chronic orchitis that the diagnosis is extremely difficult, and sometimes we have no other guide on which we can rely than the influence of remedies on the disease.—A few years ago a gentleman residing in a midland town came to London to take the opinion of surgeons respecting a disease of his testicle, which had existed eighteen months. The organ was much enlarged, and very hard and heavy, and the vaginal sac contained a small quantity of fluid. His general health was somewhat impaired. He had taken mercury, iodide of potassium, and iodide of iron, and used mercurial and iodine applications locally, but without effect in reducing the tumor. This gentleman saw Sir B. Brodie, Mr. Lawrence, and myself separately. Neither of us ventured to pronounce a positive opinion of the nature of the disease, but we were inclined to regard it as malignant. As it appeared that the mouth had not been made sore, a further trial of mercury carried to salivation was recommended, and if the enlargement did not subside under this treatment, we all agreed in advising castration. The disease, which I presume was chronic orchitis, subsided under mercurial treatment, and the patient was cured in three months. The tumor produced by chronic orchitis is more solid,

and not so elastic as a hæmatocele. It very rarely, too, attains so large a size as the latter, without causing ulceration of the tunica albuginea, and a fungous protrusion of its glandular structure. On inquiry into the history of the case the disease will be found to have come on very gradually, and not to have occurred suddenly after a blow, or to have succeeded a hydrocele, as is the case with a hæmatocele. The diagnosis is usually very easy; indeed, I have not witnessed any case of chronic orchitis in which there was any difficulty in distinguishing the disease from a hæmatocele. A hydro-sarcocele can only be distinguished from a hydrocele by an examination of the part, after the fluid has been evacuated, unless the serous effusion be very small in quantity, or the sac should happen to be loose and not fully distended, in which case the enlarged and indurated testicle may be detected through the fluid.

A chronic inflammatory is very liable to be mistaken for a true tubercular enlargement of the testicle. The mode of distinguishing the two affections will be found described at p. 259.

The benign fungus of the testicle, until recent years, was commonly confounded with malignant fungoid disease of the gland. Such a mistake is not likely to be made in the present day by any well-informed surgeon. The granulating character of the protruding mass, its consistency, and the absence of bleeding, plainly indicate the nature of the swelling. The circumstance, too, that pressure on the tumor causes the ordinary pain of a compressed testicle, whilst in malignant disease force so applied produces no such sensation, will further assist the diagnosis in any instance of doubt.

Treatment.—Chronic orchitis, if treated early, is very amenable to remedies. Depletive measures are seldom necessary. A few leeches may sometimes be applied with benefit after a fresh or sudden accession of inflammation; but even local depletion is rarely required. Mercury is the chief remedy, and generally proves very effectual before the occurrence of suppuration. As soon as its influence on the system begins to be manifested, the pain and tenderness cease, the swelling diminishes, and the induration gradually disappears. Five grains of blue pill, with a quarter of a grain of opium, may be given twice daily; and the dose can afterwards be increased or diminished according to its effects; or mercurial inunction may be substituted for the pills. No object is

gained by making the mouth very sore; but it is desirable to affect the gums slightly, and to keep the patient under the influence of the remedy until all swelling has subsided, and the induration is nearly removed, which takes place slowly, and usually occupies four or five weeks. It must be borne in mind that we have to treat a low form of local inflammation in a constitution, generally, somewhat enfeebled and impaired. The patient should therefore be allowed a nutritious diet—meat once a day, and in some instances malt liquor or wine. In persons of weak constitution the sulphate of quinine may be given during the mercurial course with much advantage,—say, two grains twice or three times a day. It must not be understood that chronic orchitis cannot be cured without mercury; but this remedy is so eminently beneficial, that where the constitution can bear it, mercury should always form an important part of the treatment. At first I generally recommend the patient to keep constantly in the recumbent position, in bed or on a sofa; but this is not absolutely necessary, and may often be dispensed with during the treatment and when the inflammation is slight. Compression by means of strapping, applied in the manner already explained, tends to promote the absorption of the adventitious deposit, and hasten the resolution of the swelling. The efficacy of mercury is so great that I have seldom employed compression without it, but I have several times combined the two apparently with much benefit. In these cases I generally strap with the *Emplastrum ammoniaci cum hydrargyro*. The reduction of the swelling and induration may also be promoted by applying to the scrotum the *Unguentum Iodinii C.*, or the *Ceratum Hydrargyri C.*, or by painting the scrotum every alternate day with the tincture of iodine. These local applications are particularly applicable to those cases in which the presence of fluid in the tunica vaginalis prevents the advantageous use of compression. It is often necessary to continue the local means and the exhibition of small doses of mercury for several weeks, before the effects of the disease are entirely removed. But it is not necessary that the patient should be strictly confined all this time. He may pursue his usual occupation in-doors, and even take gentle exercise in the open air. One great advantage of compression is, that it dispenses with confinement to the recumbent position in most of the cases in which it is employed. In cases where it is necessary to discontinue the use

of mercury in consequence of its injurious effects on the constitution, the decoction of sarsaparilla, with four or five grains of the iodide of potassium, may be given with much benefit in getting rid of the swelling and induration. The iodide of quinine or of iron are also suitable remedies under such circumstances. During the treatment the patient must strictly abstain from the excitement of venery.

The successful result of treatment necessarily much depends upon the period at which the case comes under the surgeon's care. If the disease has not existed longer than five or six weeks, the restoration of the testicle is complete; but if its duration be greater, the structure of the gland often suffers, though the organ may still be saved from complete destruction. When inflammatory action has been allowed to go on for many months, the testicle generally becomes so disorganized that all we can hope for is to arrest the progress of a disease which is a source of suffering, keeps up irritation, and tends to impair the general health; and in some instances the amount of exuded matter is so great as to be beyond the influence of absorption, and there is then no alternative but to remove the gland. This operation, however, is very rarely required; and in no instance of chronic orchitis, without suppuration, occurring in my own practice, have I had occasion to resort to it.

As the inflammation of the testicle subsides, the fluid effused into the vaginal sac usually becomes absorbed; so that the hydrocele seldom requires any other treatment than that employed for the removal of the disease which produces it. Sometimes, however, these means prove insufficient to get rid of the hydrocele, and an operation becomes necessary to make a complete cure. There should be no hurry in resorting to active measures for this purpose; for it often occurs as the patient recovers from the effects of the disease and the treatment, and his health becomes fully re-established, that the fluid in the tunica vaginalis is slowly absorbed. When, therefore, after the removal of the disease of the testicle, the quantity of fluid is so considerable as to produce a tumor of inconvenient size, the surgeon should perform acupuncture, or introduce a trocar, and having drawn off the fluid wait the result. If it should collect again he can then have recourse to iodine injection which must be employed with more than usual caution, in order

to avoid exciting fresh inflammation in the substance of the testicle. In a case which I injected lately, about six months after the cure of chronic orchitis, the operation caused a solid enlargement, from effusion in the vaginal sac, of great size; I was induced to give mercury, and afterwards tonics, under which treatment the swelling slowly but steadily subsided.

The following case will serve to illustrate many points in the history and treatment of this affection.—A captain of a ship, a man of swarthy complexion and muscular frame, aged twenty-seven, who had just returned from a voyage to the West Indies, was brought to me, October 1st, 1840, by a medical friend, for my opinion respecting the state of his testicles. It appeared that the right gland had begun to swell about a twelvemonth previously, and that six months afterwards the left had also increased in size, and they had since continued to enlarge. The inconvenience which he suffered was so slight that no attention had been paid to his complaint, which did not appear to affect his health. He was engaged to undertake another voyage in a few days; but he thought proper to consult his usual medical attendant before joining his ship. On examination I found a hydrocele of moderate size on the right side, and could without difficulty detect the testicle behind by the solidity and firmness of the tumor at this part, which were greater than usual. There was a hydrocele also on the left side, which extended some way up the cord; but owing to the looseness of the sac, and the presence of only a small quantity of fluid, I could easily feel the left testicle, which was evidently enlarged and indurated. The slight inconvenience which the patient experienced appeared to arise from the size and weight of the tumors. I drew off about six ounces of serum from the hydrocele on the right side with a trocar, and then found this testicle larger even than the left, and also very hard. In both the induration was in the body of the gland. The patient stated that he had not been subject to any complaint of the urinary organs during the last two years, and he ascribed the origin of the disease of the testicles to excessive venereal indulgence. The importance of abandoning his intention of shortly going to sea was strongly urged, and reluctantly consented to. The following treatment was adopted:—Rest in the recumbent position; three five-grain blue pills in the day; and the application of the *linimentum hydrargyri* to the scrotum.—Oct. 17th. Although the pills

had been increased to four daily, the mouth was scarcely at all affected by the mercury. The testicles were less tender, and a little diminished in size. The hydrocele on the right side returned a few days after the operation. He was now ordered to rub in a drachm of strong mercurial ointment on the inside of the thighs night and morning, and to take two blue pills daily. On the 22d the mouth was rather sore, and the fluid was entirely absorbed from the left side; and the testicle was softer, and partly reduced in size. The right testicle and hydrocele were also diminished. The treatment was continued.—Nov. 3d. The mouth was very sore: the blue pills had been omitted since the 27th ult. Both testicles were much diminished in size; but they felt irregular, and were still heavier and harder than natural. A small quantity of fluid was yet remaining in the tunica vaginalis on the right side. I ordered *Decoct. Sarzæ. cum Potass. Iodid. gr. v. ter die; pil. hydrarg. gr. ij. o. n.*; and the scrotum to be painted every alternate day with *Tinct. Iodinii C.* This treatment was continued for about two weeks. The patient was allowed good diet, and to take exercise; and as his health became re-established all effusion disappeared, and both testicles were restored to their natural size, a little induration only remaining at the end of ten weeks after I first saw him.

In the benign fungus of the testicle the treatment formerly resorted to was castration. A knowledge of the morbid changes producing this affection naturally led to better modes of practice, and now nearly all cases of this affection are found to be remediable without recourse to excision of the gland. The merit of this improvement in surgery is justly due to Mr. Lawrence, who observes that, in many instances, if the complaint were left entirely to itself the swelling would subside, the fungus shrink, and a complete cure ensue without any professional assistance. But this can seldom be the case, for the anatomical condition of the parts producing the fungus tends powerfully to prevent a natural restoration. The chief obstacle to the healing of the wound being the impediment offered by the protuberant fungous mass, it was naturally supposed that the first object in treatment was to reduce this projecting growth to the level of the surrounding skin. For this purpose pressure and various escharotics were applied to the surface of the swelling. These applications, though effectual in reducing the granulations and set-

ting up a healing process in the surrounding skin, especially when pressure and the caustic were combined, often proved tedious, and in some instances failed in obtaining a cure. Mr. Lawrence was, in consequence, led to recommend the removal of the fungus with the knife, as the shortest and most effectual mode of treatment. Sir A. Cooper also practised an operation by which, he states, "the part is excised, leaving the epididymis and testicle uninjured." But the mode of proceeding described by this distinguished surgeon would certainly not save the secreting part of the organ from extirpation. Excision of the fungus cannot indeed be regarded as a satisfactory operation. It has been seen that the projecting growth partly consists of tubuli seminiferi, and in some instances includes nearly the whole of the glandular part of the testicle, so that its removal becomes an operation which in effect is but little short of castration. It may, indeed, be doubted whether the secreting structure protruded in this affection can be so far restored as to be enabled to perform its proper functions; but it does not appear that in most of these cases the gland tissue, though more or less injured, is wholly destroyed, or beyond recovery. That the tubuli are capable of secreting whilst projecting from the scrotum has in a few instances been proved by the appearance of spermatozoa in the discharge; and I see no reason why they should not be able to continue their functions after the testicle has resumed its right place, and the sore has closed. In one case in which I had an opportunity of examining the part several weeks after cure of a large fungus without excision, there was no indication of atrophy; no reason to question that the greater part, if not the whole of the tubular structure, had been preserved in a condition fit for the office of secretion.¹ The following case, recorded by Dr. Duncan (*Northern Journal of Medicine*, June, 1845), bears on the point. A man, aged twenty-eight, was admitted into the Royal Infirmary of Edinburgh, with fungus of the left testicle. The protruded part was about the size of a large walnut, and appeared to include the greater part of, if not the entire, gland. The fungus was consequent upon disease of

¹ Wax models of the fungus, and of the organ after cure, are preserved in the London Hospital College, and duplicates of them were presented by me to the Royal Academy of Medicine in Paris. The healthy state of the other testicle prevented my ascertaining with certainty the secretory powers of the one which had been diseased. The case, a syphilitic one, will be found related at p. 250.

four months' standing. The right testicle had been diseased at a former period, and no trace of it remained. The scrotum was incised on each side of the fungus, and the organ replaced, as suggested by Mr. Syme, and partial union took place by the first intention. In about six weeks the patient left the hospital with the wound quite healed. At this time Dr. Duncan ascertained that the man's sexual feelings were unimpaired; and, at a later period, had reason to believe that the powers had been tested.

The result of treatment in this case seems to have been satisfactory, but as the report was a recent one, and as it does not appear that the secretion was examined, the efficiency of the organ cannot be said to have been fully ascertained.

The object of the surgeon should be to endeavor to place the diseased organ as nearly as possible in its former site and condition, and the greater his success the more perfect will be the character of his practice. Upon this principle the extirpation of any part of the gland is objectionable, especially as it seldom happens that the healing of the wound cannot be obtained by other treatment almost as readily as by excision of the fungus. The same objection as that made to excision applies to the practice also recommended of tying a ligature tightly round the base of the projecting tumor, in order to produce strangulation and the death of the part; a plan of treating these cases which is not only more tedious, but more painful than excision.¹ I have stated that when the fungus protrudes, in consequence of the glandular tissue being relieved from pressure, the original disease becomes less active, and often subsides, and that the pain likewise ceases. It would be wrong, however, to conclude that the exuded lymph, though ceasing to act injuriously by pressure, always becomes absorbed, and that the structure of the testicle at once recovers its healthy state. The constitutional depravity leading to the disease often remains, and the size of the projecting fungus, a size often much greater than would result from granulations on the surface of the extruded tubuli, indicates the presence of adventitious deposit in the substance of the organ. This would seem to have been lost sight of in the treatment until Sir B. Brodie recommended, in addition to the application of escha-

¹ In the ninth case described by Mr. Lawrence, the ligature is reported to have caused severe pain, followed by sickness and pain in the cord and loins, indicating that the part constricted comprised glandular structure.

rotics, recourse to the usual remedies for chronic orchitis.¹ This practice, combined with an effectual mode of repression by compresses and strapping, was advocated by me in 1843,² on the ground of practical experience of its efficacy.

In 1845, Mr. Syme, of Edinburgh, who seems to have been under the impression that the treatment generally adopted was to excise or cauterize the fungus, communicated to the profession³ what he considered to be an improved mode of practice, by which the testicle was preserved entire, and the period of cure shortened. He described the principle of this mode as consisting in the application of compression, simply by enclosing the fungus within its proper covering of the scrotum, which he effected by an operation. He cut round the fungus, and extended the incision upwards as well as downwards, so as to give it an elliptical form. The integuments were then separated on each side, and brought over the growth, where they were retained by stitches. The scrotum was supported by plasters and a bandage. Mr. Syme states that the surface of the fungus being coated by granulations unites with the surface of the integuments as soon as it becomes incrustated with effused lymph; and in order to facilitate the healing process he recommended the removal of the hard ring of skin through which the fungus protrudes. Two cases are described: in one the part healed in four weeks, and in the other in three weeks. Though this operation is in many instances uncalled for, the case readily admitting of cure without it, the conception was a good one, and in certain cases this plan undoubtedly promotes and hastens the healing process. But the operation is unfit for those cases in which much enlargement of the exposed gland still exists from adventitious deposit in its substance; at any rate until partial reduction of the growth has been first obtained by constitutional treatment and rest. In several of the cases operated on in London, respecting which I have obtained information, the flaps did not readily unite over the fungus, but receded considerably after division of the sutures, allowing a certain amount of protrusion, so that the wound afterwards healed slowly by advancing cicatrization, as in the treatment by pressure and escharotic applications.

¹ Vide Medical Gazette, vol. xiii, p. 222.

² Vide first Am. edition of this work, p. 345, in which the treatment by ligature and excision was strongly condemned.

³ London and Edinburgh Monthly Journal, Jan. 1845.

Having given a brief account of the various modes of treating the benign fungus of the testicle, which have been adopted since its true nature was explained by Mr. Lawrence, in order to place in a clear light the successive improvements in practice, I proceed to describe the treatment which I believe to be best suited to the affection in the circumstances under which we meet with it. In cases of a recent character the patient should be directed to keep in bed; and if there is any tenderness or pain in the testicle, to take four or five grains of blue pill night and morning, until all symptoms of morbid action are removed. A piece of lint of sufficient size to cover the sore, having been dipped in a solution of the nitrate of silver in the proportion of ten grains to the ounce, is to be placed on the part. One or two compresses of lint are to be applied over this, and tolerably firm compression is then to be made by several strips of adhesive plaster, and the whole is to be secured by a bandage. This is to be repeated daily; and as the protrusion recedes the scrotum is to be drawn over it, and the edges of the wound are to be gradually approximated by narrow strips of plaster. Under this treatment cicatrization takes place, and the testicle steadily resumes its place in the scrotum, remaining firmly adherent to the new skin. In cases where there is no enlargement and no occasion for the exhibition of mercury; or after its discontinuance, if the general health be impaired, the sulphate of quinine, iodine, or steel medicines, may be combined with the local remedies. Other escharotics are also effectual in keeping down the granulations and promoting a healing action, such as a solution of the sulphate of copper, and the ointments of the nitric oxide of mercury, or of the red iodide of mercury. When the fungus ceases to project, the black wash makes a good application.

In those cases in which the fungus projects considerably, its neck being girt by the scrotum; and in old-standing cases, in which the integuments around the fungus are thickened and unhealthy, the operation practised by Mr. Syme will much assist the cure and shorten its duration. In some instances I have been content with dissecting away the thickened margin of skin encircling the fungus, and freeing the integument only at the part girding the base of the projecting tumor, by an incision an inch and a half long, and dissecting back a triangular flap of skin on each side, leaving the sore, as the fungus is repressed by pressure, to close by gradual cicatrization.

I have described the occurrence of suppuration in the testicle followed by the formation of troublesome sinuses. We cannot, of course, treat these sinuses as we should similar passages in other parts, by injecting them, or laying them open from the bottom. We can only endeavor to remove any existing disease by the ordinary remedies for chronic inflammation, in the hope that as the health improves they may be induced to heal. Their cure may be a good deal promoted by keeping the testicle steadily compressed by means of strapping. In some instances these fistulous passages prove so tedious, and so affect the general health, that it becomes desirable to resort to the operation of castration. I once witnessed the removal of a testicle from an elderly man on this account. On examination the epididymis was found encased in the serous membrane, much indurated and thickened; the tunica vaginalis contained a quantity of serum. There were three distinct deposits of inspissated pus in different parts of the epididymis, and at its lower part a suppurating cavity, lined by a rough-looking membrane: the cavity opened externally by a fistulous passage leading to the bottom of the scrotum. The body of the testicle was quite sound. The patient had suffered from the disease for eight months, and it had resisted the ordinary treatment. In cases, too, of pus effused in the testicle without finding any vent, there is often an indolent intractable enlargement of the gland, which continues stationary, does not yield to remedies, and is attended with very little or no pain; but still causes so much annoyance to the patient, and so disturbs his mind, that he becomes desirous of parting with the organ in order to regain his health and resume his customary occupations.—In March, 1841, I was requested to visit the master of a ship, a man aged forty-three, in consequence of a chronic enlargement of the right testicle, which had been gradually forming for many months. The mouth had been made sore by mercury, and various stimulating applications to the part had been used, without any effect on the disease. He did not suffer much, and was desirous of returning to his ship; but Mr. Arthur, his medical attendant, considered it unsafe for him to go to sea again with such a disease unrelieved. As the swelling had not subsided under the remedies which had been judiciously tried and persevered with, I recommended the removal of the gland, to which the patient readily consented, rather than submit to any long confinement. I accordingly performed the

operation, from which the patient recovered, so as to be able to join his ship in a month. The testicle was enlarged to more than thrice its natural size. The surfaces of the tunica vaginalis were closely adherent. On making a section of the tumor no trace of the natural texture of the gland was apparent, its place being supplied by irregular masses of lymph and soft purulent deposits, separated by thick septa of fibrous tissue.

In some instances, when pus is pent up in the testicle, the organ continues enlarged and tender, and the seat of a dull chronic pain, the matter proving a continual source of irritation. These symptoms may be relieved by rest, local depletion, and mercury; but the benefit is in general only temporary, the patient continuing to suffer more or less, and frequently experiencing relapses. For this state of the organ there is seldom any other remedy than castration. The following case is related by Sir A. Cooper.—“A surgeon in the cavalry had an inflammation and chronic enlargement of the testicle, which had been repeatedly relieved by the recumbent position, local depletion, and the use of mercury; yet when he returned to the exertions necessary to the due performance of his military duties, the symptoms were renewed. Tired by these repeated disappointments, and unable to pursue his profession satisfactorily, he requested me to remove the part, to which I consented, and found, upon dissection of the testicle, a chronic abscess in the centre, which kept up irritation of the part, and repeatedly reproduced the inflammation.”¹ In cases of this nature the presence of pus cannot be ascertained with any degree of accuracy. No surgeon, therefore, would think of resorting to castration till after a persevering trial had been made, with the usual remedies for the reduction of chronic inflammation of the gland.

SECTION III.

SYPHILITIC ORCHITIS.

Persons affected with syphilis are subject to a chronic morbid enlargement of the testicle, known by the term *syphilitic sarcocoele*, it being considered one of the sequelæ or constitutional effects of the venereal poison. This affection of the testicle occurs in two stages of the disease, as a symptom of secondary and of tertiary syphilis.

¹ Lib. cit. p. 44.

It is a form of chronic orchitis, and though essentially of the same nature in the two stages of syphilis, differs materially in its progress and in its readiness to yield to remedies at these periods of the constitutional disease.¹

When the testicle is affected during secondary syphilis, the orchitis occurs generally within a twelvemonth after the primary infection, but is a late symptom of this stage of the disease. It is usually accompanied with a pustular or scaly eruption, or ulcers in the throat, and sometimes with iritis and periosteal inflammation. The enlargement takes place slowly and in the same manner, is accompanied with the same dull pain and sense of weight, and the disease maintains the same indolent character throughout its entire course, as in chronic orchitis. It commences in the body of the gland, seldom affects the epididymis, and rarely terminates in suppuration, or in the production of a hernial fungus. A granular swelling may occur, however, as in the case related at p. 250. The disease is generally limited to one testicle.

In cases of tertiary syphilis, orchitis is liable to occur at any period of the disease, and often does not appear till four or five years after infection, and sometimes even, not till later. The constitutional symptoms consist of subcutaneous tubercles, unhealthy ulcers, phagedenic sore throat, and nodes in various parts, especially the latter. The local changes are nearly of the same character as in secondary syphilis. They are still more indolent, an enlargement of the testicle often occurring without the patient being aware of it; and the disease sometimes ends in suppuration. The epididymis is liable to be affected in this stage of syphilis, its upper part, the globus major, becoming hard and nodular. Both testicles commonly become diseased, either simultaneously or in succession. The subjects of this form of orchitis are pale, emaciated, and feeble, their constitutions having been seriously impaired by the venereal poison, and often by the treatment employed for its removal.

Chronic orchitis is liable to occur in persons who have suffered from syphilis after the constitutional symptoms have nearly or completely disappeared. In such cases it becomes questionable whether

¹ The occurrence of orchitis in the two stages of syphilis, and the modifications of treatment applicable at these periods, were particularly noticed by Mr. John Hamilton, of Dublin, in a valuable practical Essay on Syphilitic Sarcocoele, published in 1849.

the disease of the testicle is not the result of a depraved state of system, rather than a symptom of the syphilitic poison.

Like other syphilitic symptoms the chronic enlargement of the testicle is apt to recur after subsiding under treatment insufficiently prolonged. Mr. H. Ludlow has described the case of a man in St. Bartholomew's Hospital on account of syphilitic orchitis, whose testicle had enlarged five times within three years. It invariably resumed its natural state under the use of mercury or iodine. Sir A. Cooper mentions¹—"A man applied to me in November, 1807, with a testicle diseased, and hard as a marble. Four years before he had a venereal complaint, and in a few weeks afterwards the testicle became enlarged; but under the use of mercury it was reduced in a month. In four months after the swelling in the testicle returned, and in two months it again disappeared by the same treatment. Two years ago it swelled again, and was again relieved; and in the last spring it became again swollen, and now, in the month of November, it is of large size."

Owing to the curability of syphilitic orchitis, I have had no opportunity of investigating the morbid changes which occur in this disease. Sir B. Brodie mentions one instance in which he examined the venereal testicle, and found the morbid appearance to correspond with those observed in simple chronic inflammation,² a statement which is confirmed by the observations of Cruveilhier and Mr. Hamilton. The latter particularly notices also the occurrence in the diseased testicle of advanced syphilis, of yellow deposits of a tubercular character, both in the body of the gland and in the globus major of the epididymis. It does not appear that the tubercular character of the yellow substance has been determined by microscopic examination, but it is highly probable that Mr. Hamilton's view of its nature is a correct one. In describing the changes occurring in simple chronic orchitis, I noticed the presence of two morbid products, one fibrinous and extra-tubular, and the other tubercular and intra-tubular; and I suggested that the latter was probably the result of a local disturbance in nutrition, not the local manifestation of a constitutional disorder. But in tertiary syphilis the enlargement of the testicles takes place in persons whose constitutions are enfeebled and seriously impaired by long-existing general disease, the blood being depraved, and the nutri-

¹ Lib. cit. p. 107.

² Medical Gazette, vol. xiii, p. 379.

tive functions badly performed. And as we know that in this condition tubercles are not unfrequently developed in the lungs, it seems a reasonable conclusion that in the worst forms of venereal testicle, the tubercular product prevails locally to a greater extent than in simple chronic orchitis, or than in the orchitis of secondary syphilis.

Syphilitic orchitis disorganizes and destroys the testicle in the same way as ordinary chronic orchitis. After the exuded matter has disappeared under treatment, the organ sometimes suffers complete fibrous degeneration. Mr. Hamilton has related the case of a man, aged thirty-six, both of whose testicles had been attacked with the disease, and had undergone this change, of course, with complete loss of his virile powers. Suppuration may occur, and also end in atrophy of the gland.

Treatment.—The disease of the testicle occurring in secondary syphilis should be treated on the same principles as ordinary chronic orchitis. The striking efficacy of mercury in the latter affection has been already pointed out. In syphilitic orchitis mercury is required not only for the removal of the disease in the testicle, but also for the cure of the other syphilitic symptoms. It is necessary, too, to continue the mercury for six or eight weeks,—to keep up its influence on the system for a longer period than in simple chronic orchitis. I prefer, on the whole, mercurial inunction, a drachm of the strong mercurial ointment being well rubbed in on the thighs daily. I often prescribe, however, five grains of blue pill with a quarter of a grain of opium, to be taken night and morning, or, if the bowels are irritable, five grains of chalk and mercury with a quarter of a grain of opium may be given three times a day. The decoction of sarsaparilla, with small doses of the bichloride of mercury, and the iodide of mercury, are also well suited to this disease. In persons of weak constitution the sulphate of quinine may be combined with the mercurial remedies, especially with inunction. Though I have no great confidence in any other treatment than the mercurial in effecting a permanent cure, it sometimes happens that the remedy proves so depressing, or renders the constitution so irritable, that it is impossible to persevere with it. In such cases the iodide of potassium may be substituted with much benefit, or this valuable remedy may be given after a short mercurial course, as in the following case, in which extensive deposition in the testicle had caused the investing tunics

to give way, and an unusually large benign fungus to protrude. The disease yielded very slowly, but steadily to the mercurial and iodine treatment.—J. S., aged twenty-nine, a stoker, came under my care in the London Hospital in December, 1851, on account of a large benign fungus of the left testicle. He had contracted syphilis about a year before, and there was a large dark-brown patch covered with a thin scab on the fore part of the left thigh, and a similar blotch in front of the left leg. He first noticed a swelling of the testicle about two months previously, the gland slowly increasing until it attained a considerable size before the integuments gave way, which occurred about a month after the commencement of the swelling. On examination I found the testicle greatly enlarged; a fungus, measuring no less than two inches and a half in length, and nearly two inches in width, projected in front of the scrotum. This fungus had an even rounded surface, and was of a dusky red color. It overlapped the thickened margin of the scrotum, especially at the lower part where the skin slightly girted the neck of the swelling. He had been a strong muscular man, but was looking pale, and out of health, and had lately lost flesh considerably.—Dec. 11th. I divided the integument girding the lower part of the fungus by an incision an inch and a half long; dissected back a triangular flap of skin on each side, and excised some of the margin of the thickened integument. The solid nitrate of silver was afterwards applied freely to the surface of the fungus; and a thick dossil of lint being placed on the part, the integuments were drawn forwards with strips of plaster. I ordered him to bed, and to take *Pil. Hydrarg.* gr. v. c. *Op.* gr. ss. n. et m., and the application of the lunar caustic and the dressings to be repeated daily. In about ten days the mouth became sore, and the fungus was found considerably reduced in size, but the integument around evinced very little disposition to heal. The influence of mercury was kept up until the 29th, when it was discontinued, and *Dec. Sarzæ c. Pot. Iodid.* gr. v. *ter die* prescribed. Six ounces of wine were added to his full diet. The black wash was applied to the fungus, which was covered with a compress and strapped as before. On Jan. 10th, 1852, the patient's health was much improved. The syphilitic blotches had nearly disappeared, and the fungus was found by measurement reduced to a third of its original size, and cicatrization was advancing at its base. The same treatment was continued, but he was allowed to leave his bed. From this time

he mended steadily. He entirely regained his health, and became stout, but the healing process advanced so slowly that the sore had not entirely closed before March 18th. When he was examined five weeks later, the testicle appeared of ample size, and perfectly restored. At the end of two months the patient was still in good health.

The treatment of the orchitis of tertiary syphilis must depend very much on the patient's general condition, on the duration of the syphilitic disease, and the extent to which the constitution has been impaired by the poison. In many instances, unfortunately, the orchitis is the least important of the local affections from which the patient suffers. When mercury can be safely given, this remedy in small doses, combined with the iodide of potassium, and long continued, indeed for two months or longer, will be the best mode of thoroughly eradicating the disease, reducing the enlargement of the testicle, and rendering the organs safe from a relapse. If the patient be allowed at the same time a good nutritious diet, meat twice a day, with wine or porter, the constitution will be so strengthened as to bear the influence of this remedy. In cases unfit for mercury we must rely on the iodide of potassium alone, which should be given in doses of from three to five grains three times a day for some months. M. Ricord and M. Vidal, the distinguished surgeons of the Venereal Hospital in Paris, have great confidence in the efficacy of the iodide of potassium in these cachectic cases of syphilitic orchitis.

The observations on the local treatment of simple chronic orchitis are equally applicable to the syphilitic disease of the testicle.

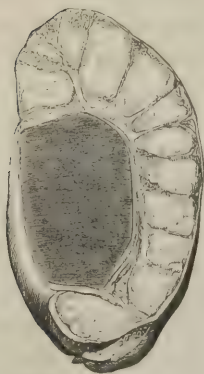
CHAPTER VII.

TUBERCULAR DISEASE OF THE TESTICLE.

THIS disease generally attacks primarily the epididymis, occurring in the form of yellow crude tubercle. In the body of the testicle it usually appears at first as small pearly or grayish bodies of the shape and size of millet seeds, which are ranged in lines like strung beads, being however less abundant and less regular at the front of the testicle than towards the rete testis, where they are closely set,

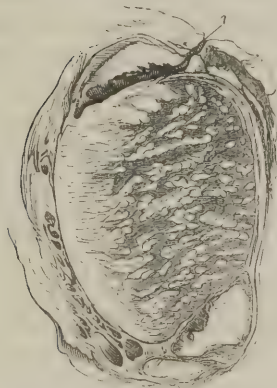
and sometimes confluent. These little bodies coalesce, increase, and become changed into a yellow friable cheesy substance, which at a later period softens, and is often broken up into a curdy purulent fluid.

Fig. 34.



Crude tubercle commonly forms several distinct deposits in different parts of the testicle at the expense of the glandular structure, which disappears as the disease advances. The epididymis is not only more frequently attacked than the body of the testicle, but when both parts are affected, the disease is always more advanced in the former than in the latter. In a specimen taken from a man who died of phthisis (Fig. 34), I found the whole of the epididymis occupied by crude tubercular matter with scarcely a trace of ducts, whilst the body of the gland, though small, was free from morbid deposit. In several instances I have observed small bead-like bodies in the substance of the gland, which was but little enlarged, whilst the epididymis

Fig. 35.



1. Fistulous sinus, leading to a suppurating cavity in the head of the epididymis;
2. Caseous deposit in its tail.¹

was swollen to double or treble its proper size, and filled with a yellow caseous deposit. Tubercle is liable to form in all parts of the epididymis, but it occurs first in the head, and is generally most advanced in this part; whereas in orchitis the tail is the part primarily and most frequently affected. In Fig. 35 isolated tubercles are seen in the body of the testicle, appearing more numerous towards the rete testis, where they are seen coalescing and forming a number of closely set yellow lines or processes. Suppuration has taken place in the head of the epididymis, and a mass of caseous deposit occupies its lower part.

¹ In the first edition of this work this figure was erroneously described as a representation of chronic orchitis. A careful microscopic examination of it, recently made by Dr. Andrew Clark and myself, has fully satisfied us of its tubercular character.

In testicles which have been affected for some time, the greater part of the gland is invaded by the morbid deposit. This was the case in both testicles removed from a middle-aged man who died of phthisis. They were injected with colored size, and a section of one of them reduced in size is represented in Fig. 36. These and some others in which the disease was similarly advanced, made beautiful preparations, the yellow tubercular matter contrasting in a marked degree with the vermilion hue of the intervening remnants of glandular structure highly injected. In a later stage of this disease the characteristic deposit becomes softened down and converted into a yellow pultaceous substance; inflammation is set up, new products are evolved, and pus is formed. The abscess extends to the scrotum; and after it has burst, and the matter has escaped, cavities and sinuses are left which resemble tubercular cavities in the lungs. In cases where the disease has been largely developed, the whole gland is tunnelled by fistulous passages.

Fig. 36.

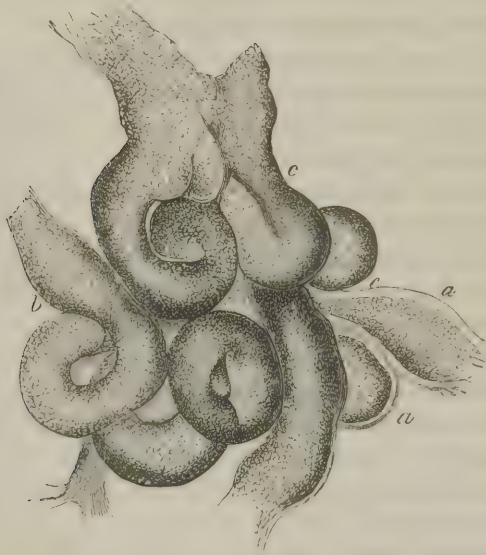


In tubercular testicles the tunica vaginalis usually contains a small quantity of serum, and its inner surface exhibits marks of inflammatory action, the opposing surfaces being partially connected by lymph either recently exuded or of older date. The vas deferens in many instances is also loaded with serofulous matter.

A minute examination of the tubercular testicle clearly proves that the disease is originally developed within the tubules or ducts. The following account of the histology of these deposits is the result of careful investigation, in which I have to acknowledge the valuable aid of my colleague, Dr. Andrew Clark. The small isolated yellowish-gray bodies found in the testicle in the early stage of the disease are composed of coils of diseased seminal tubes with altered contents, a little fibroid tissue, and branches of disintegrating blood-vessels. The tubules most distant from these bodies are usually healthy, but as they approach the tumors they are irregularly distended at intervals, and their fibrous coat is observed to be thickened, opened up, studded with fat-granules, and splitting. Their contents consist mainly of large cells, some of which exhibit vesicular nuclei,

and are disintegrating; of smaller shrivelled cells, of irregularly shaped nuclear particles, and of a small quantity of granulo-molecular matter. The distension of the tubules in some places is

Fig. 37.



A coil of seminal tubes affected with tubercle (about 80 d.).—*a*, *a*. Thickened walls of the tubes; *b*, Dilated tubes; *c*, *c*. Constricted tubes.

sudden and globular, so that the distended portion with its contents represents a small tumor. From the circumference the tubules may be traced into the larger tumors, which are composed of their coils. The walls of the tubes and their contents become gradually changed as they reach the centre. The bloodvessels surrounding them may be observed disintegrating, and the nucleated fibroid walls broken up.

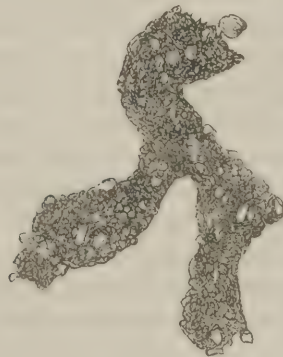
The matter which occupies the diseased tubes and forms the tumors in the body of the testicle, as also that deposited in the epididymis, corresponds to the scrofulous or tubercular matter observed in other organs. This matter originally forms within the tubes, and accumulates there until the tubes burst and their contents are extravasated into the surrounding tissues. Its production is preceded by a state of congestion, but does not appear to be followed by the exudation and growth of organized lymph. "This matter,"

Dr. Andrew Clark observes, "arises by a process of abnormal nutrition in the cellular contents of the tubes, the different aspects of its structural elements being determined by the different phases of retrogressive metamorphoses through which it passes. In the early stage this matter consists mainly of large cells and the products of disintegration. Some of these cells become filled with fat-granules, and after a time become broken up; others develop nuclei, which are afterwards extruded and persist; a third class simply shrivel and disintegrate. During these latter stages much moleculo-granular matter and free fat accumulate; and this, with the free nuclei and shrivelled cells, constitutes the leading structural feature of the deposit. With further disintegration more molecular matter and fat are developed, and at last earthy salts." Coincident with the changes occurring in the contents of the tubes, their walls and the small bloodvessels become variously changed, split up, and disintegrated, so that their elements after a time become mixed with the original deposit chiefly in the form of nuclear fibres and nucleated fibroid tissue. When the deposit has proceeded to such an extent

Fig. 38.



Fig. 39.



Amorphous and crystalline earthy matter in the interior of a seminal tube. (About 70 d.)

as to rupture the tubes and cause extravasation, the local circulation becomes embarrassed and frequently, though not always, an exudation occurs from the bloodvessels which infiltrates the deposit and adjacent parts. Such an exudation usually retards the progress of the deposit, and especially its disintegration.

Earthy matter, exactly similar to the dry-putty-looking chalky matter observed in the lungs and bronchial glands of persons who have been affected with tubercular disease, is sometimes found in the testicle, most commonly in the epididymis. There is every reason to suppose that in these cases the gland had at some former period been the seat of tubercular deposit. A good specimen of this calcareous matter in the epididymis, from the collection of the late Sir A. Cooper, is represented in Fig. 38. The epididymis is enlarged, and contains three separate deposits of this matter, whilst the body of the testicle is perfectly sound. The earthy matter, resulting from the transformation of tubercle, has also been distinctly recognized in the tubuli of the testicle, which appear irregularly contracted as in Fig. 39.

Tubercle, though sometimes formed in the testicle in the earlier periods of life, does not usually occur till after the development of the organ at puberty. We have very little information respecting the relative frequency of this deposit in the testicles, as compared with other organs. In the tables of Louis, Lombard, and Papavoine, no mention is made of the testicle. Rokitsky places these organs low in the order of frequency. I have seen a large number of cases of tubercular testicle, and believe the disease to occur primarily in this organ more frequently than is generally supposed. In many instances only one gland is attacked; but not unfrequently both are affected simultaneously, or one shortly after the other.

The occurrence of this disease in the testicle must, no doubt, be viewed as one of the manifestations of the peculiar morbid state of constitution commonly known by the term *scrofula* or *tuberculosis*. It appears, however, that a weak condition of the organ, or an impaired organization consequent upon previous disease, tends greatly to favor the development of tubercle in this part. Thus, in two cases of phthisis in which I met with it, the patients were both affected with obstinate strictures, and had suffered from consecutive orchitis in early life.

Symptoms.—The disease commences insidiously, and is indolent in its progress. The patient's attention is usually first attracted by a slight uneasiness in some part of the gland, generally the epididymis, which on examination is found to be somewhat enlarged, prominent, and hardened. Sometimes the whole organ feels slightly enlarged and indurated, though it more frequently forms a tumor

with an unequal and irregular surface. The state of the testicle, however, is often masked by small local effusions of fluid in the tunica vaginalis, the surfaces of this membrane being partially adherent. Very little pain is experienced in the part, and there is but slight tenderness on pressure. After the disease has lasted for some time, many months or even a year and more, making little progress, and often remaining stationary, one of the prominences begins to increase, so as to be observed externally, and to feel painful and tender; the skin over it becomes adherent, changes to a livid hue, ulcerates and bursts, giving vent to a soft caseous matter mixed with pus. This is followed by the formation of a fistulous sinus, which discharges a scanty thin serous pus, mixed with particles of tubercular matter, and often with semen, particularly after venereal excitement. Similar changes may take place in other parts of the testicle, occasioning two or more sinuses leading to the interior of the gland. These sinuses sometimes communicate, and they may continue open and discharging for a great length of time. After the deposit has all come away, if the original disease be arrested, and no more tubercular matter formed, reparative changes sometimes take place; the discharge ceases; the fistulæ close up, leaving the organ more or less diminished in size or entirely wasted, according to the extent to which it had been disorganized by the tubercular deposit. A small pit or depression with adhesion of the cicatrix to the testicle remains to indicate the spot where the fistula opened. The bursting of the abscess and escape of the tubercular matter is rarely followed by any hernial protrusion of the testicle, the seminal tubes being largely destroyed at this stage of the disease.

Strumous disease of the testicle is not often seen in the suppurative stage in children, or before the age of puberty.—A little boy, aged five years, with fair complexion, bright eyes, and florid cheeks, was brought to me at the hospital in March, 1842, on account of an affection of the left testicle. This gland was three or four times the size of the right; of an oval form, with an uneven surface, so as to feel nodular; extremely indurated, indeed almost as hard as cartilage; and was nearly insensible to pressure. I ordered small doses of the *hydrarg. cum cretâ*, and the camphorated mercurial ointment to the part. As the swelling remained but little changed at the end of three weeks, I prescribed the

decoction of bark, with iodide of potassium, and some iodine ointment to be applied to the testicle. In May the skin became adherent to the lower part of the gland; an abscess formed, and about the middle of June burst, and discharged some caseous matter and thin pus, and left a fistulous opening. The health began to fail, which induced me to substitute some steel medicine for the iodide of potassium. The mother became phthisical and too ill to bring the boy, and I saw nothing more of him till the father brought him to see me in the following November, when I found the fistula closed, the testicle a good deal reduced in size, but still hard and nodular, and adherent to the lower part of the scrotum. The boy's health was much improved. Another small abscess subsequently formed and burst as before, since which I lost sight of the patient. Mr. Lloyd relates the following case.—A child, three years and a half old, was brought to him with the right testicle affected. The whole scrotum was distended with matter, and appeared like a scrofulous abscess in any other part of the body, and the skin was so thin that you might see the matter through it. A poultice was applied, and in a few days the abscess burst; and the aperture soon enlarged so much that full half of the gland projected through the scrotum, and was converted into a mass of yellow scrofulous matter, which a few days after separated, leaving the remainder of the gland enlarged and hardened. This was, however, rapidly diminishing, and seemed likely to entirely waste away.¹

The testicle alone may be affected with tubercle, but the disease is more commonly associated with scrofulous affections of other parts.² The patient is either phthisical, or subject to strumous swellings of the lymphatic, or mesenteric glands; or affected with disease of the spine, hip, knee, or some other articulation, and manifests the ordinary characteristics of a scrofulous constitution; so that in many cases, certainly in the majority of those which have come under my notice, the affection of the testicle was of secondary importance to disease existing in other organs, and to the morbid state of the system generally. The constitution, also, is very slightly affected by, or sympathizes very little with, the morbid changes going on in the testicle.

¹ Treatise on Scrofula, p. 93.

² The vesiculæ seminales are also very liable to be affected with the same disease.

Diagnosis.—Tubercular disease of the testicle may be mistaken for chronic inflammatory, and malignant enlargements of the gland. Writers often confound the former of these affections with the tubercular, being misled by the indolent nature of the swelling and the yellow appearance of the morbid deposit in chronic orchitis. The strumous differs, however, from the chronic inflammatory swelling in being more indolent; in making even slower progress, and being attended with still less pain and inconvenience; in the irregular surface and smaller size of the swelling; and, when the epididymis is attacked, in the globus major being the part principally affected, instead of the lower part, which is usually first enlarged in chronic inflammation. The diagnosis, however, may be extremely difficult, as in both cases the changes in the gland or in the epididymis are liable to be masked by inflammatory effusion in the tunica vaginalis. It is of much importance to make a right distinction, for the remedies proper for orchitis, if given in tubercular disease, may do considerable harm. In one case of error which came under my notice phthisis was rapidly developed at the conclusion of a course of mercury. The disease may be distinguished from malignant enlargements of the organ by the smaller size, uneven surface, and more indurated nature of the swelling, and by its very chronic progress. In all cases the judgment of the surgeon will be materially assisted by his noting the general characters of the constitution, and whether there is any concomitant affection of other parts.

Treatment.—From what has been remarked in reference to this disease, it will naturally be inferred that the remedies of most consequence are those calculated to correct the morbid state of constitution which predisposes to local scrofulous deposit. The patient should reside in a pure air in the country, and, if possible, by the sea-side, for many months. He should take gentle exercise. The diet should be nutritious, consisting of a due proportion of animal and vegetable food; and stimulating viands and drinks must be prohibited. Malt liquors, as light pale ale, or a glass or two of wine, may, however, be taken in many cases with advantage. Medicines which tend to improve the appetite and give tone to the digestive organs are required. The sulphate of quinine, the preparations of steel, and cod-liver oil are appropriate medicines. There is, however, no remedy which exerts a more beneficial in-

fluence in this affection than the iodide of potassium. I usually prescribe for the adult the *decoctum sarzæ*, with two or three grains of the iodide of potassium, to be taken three times a day for some length of time, directing it to be discontinued for two or three days or a week, and again resorted to. When the patient is in a good air the constitution and local symptoms often mend in a remarkable degree under this treatment. Mercury, which is so eminently beneficial in chronic inflammation of the testicle, is seldom of service in this disease; indeed, as in strumous affections generally, its influence is usually prejudicial. Small alterative doses, as four grains of Plummer's pill, taken at night, or the sixteenth of a grain of the bichloride of mercury given in the *decoctum sarzæ* twice or thrice in the day, have sometimes been resorted to with advantage; but my experience generally leads me to regard the use of mercury in any form as improper in this affection.

When inflammatory symptoms exist they must be combated by the application of leeches, fomentations, and rest in the recumbent position. Antiphlogistic measures are not often necessary. In all cases the gland must be supported. In the indolent stage of the disease the local treatment consists in painting the scrotum with the tincture of iodine every alternate day, or in applying the *Ung. Iodinii Comp.*, mixed with an equal proportion of lard. When suppuration ensues the part is to be poulticed; and after the abscess has burst, the orifices of the sinuses must be kept open, to allow of the free escape of the morbid deposit. In certain cases in which tubercle is largely developed, and is not thus got rid of; and in others in which the sinuses tunnelling the gland show no disposition to close, but remain obstinate and troublesome, castration may be necessary. This operation, however, is seldom required, and it should never be performed when signs exist of advanced disease in the lungs.

CHAPTER VIII.

CARCINOMA OF THE TESTICLE.

CARCINOMA occurs in the testicle under the three forms of Scirrhus, Encephaloid, and Melanosis.

SECTION I.

SCIRRHUS OF THE TESTICLE.

Carcinoma seldom affects the testicle in the dense form which it commonly assumes in the breast. Sir A. Cooper describes a scirrhus affection, in which the testicle is invaded by a large white mass in lobes or tubercles. The spermatic cord is attacked with a similar disease, and the glands of the abdomen become converted into a white solid texture, unlike that of the fungoid disease. The organ affected feels tubercular, irregular, and excessively hard, and is the seat of severe pain, which extends to the loins. The morbid mass never becomes soft, nor so large as the encephaloid cancer, nor does it produce a fungoid or bleeding surface. Ulceration, indeed, rarely occurs, but the patient becomes cachectic; his countenance appears sallow, and he sinks under impaired digestion, pain and tumor in the abdomen, with œdema of the lower extremity on the side affected, and sometimes ascites.

This form of cancer is characterized chiefly by its slow progress and great hardness during the whole continuance of the disease, and also by its irregular and tuberculated feel. It occurs less frequently in different parts of the body at the same time than encephaloid cancer, and is slower in proceeding to a fatal termination.

This carcinomatous affection of the testicle is rare, and only a few cases have come under my notice. The following examples will serve to illustrate some of the chief features of the disease.—In July, 1844, a corpulent gentleman, aged fifty-eight, consulted me on account of a disease of the left testicle. He stated that he first perceived a hardness in the gland about five years before. He paid no attention to it for two years, when the part became enlarged and inflamed, and an abscess formed in the scrotum, and after it burst he got relief. The opening closed, but the increased enlargement only partially subsided. I found the left testicle converted into an irregularly shaped body the size of a large orange, and extremely indurated. The scrotum was puckered, and adherent to its front part. Firm pressure caused very slight uneasiness. The spermatic cord was also very much enlarged, and formed a thick rounded body extending far into the inguinal canal. The right testicle was sound, but there was a swelling the size of a hen's

egg in the right groin. He suffered occasional pains, chiefly in the left testicle and right groin; but they did not disturb his rest. He had no uneasiness in the loins. This gentleman appeared in tolerable health. His appetite was good, and he was able to walk several miles. The disease slowly increased without producing any severe suffering, and he died in December, 1845. On examination of the body the disease was found to consist of hard cancer, which had extended into the abdomen and involved the bladder. The abdominal viscera were unaffected. There was no attenuation, the abdomen being thickly covered with adipose tissue.—J. M., aged fifty-two, a carpenter, came under my care at the London Hospital in 1849, on account of scirrhus disease of the right testicle. He stated that the organ had been squeezed about seven years ago, which caused swelling. It became hard and enlarged four years afterwards. The organ was about three times its natural size, and almost of stony hardness, especially at its back part. There was also an indurated tumor half the size of the diseased gland, in the spermatic cord, extending to the abdominal ring. No swellings could be detected in the lumbar region, nor did he complain of uneasiness there. He suffered severe pain in the testicle, especially at night. He remained under observation several months, during which period the disease made scarcely any progress.

These two cases are well-marked examples of hard cancer of the testicle. The first is remarkable for the small amount of pain attending the development of the disease, and the slight degree in which the constitution suffered from it. In both instances the progress of the cancer was extremely chronic. There is no other remedy for this disease but castration, which must not be delayed so as to endanger a production of the disease in the spermatic cord, or the growth of a tumor in the abdomen.

SECTION II.

ENCEPHALOID CANCER OF THE TESTICLE.

Encephaloid or medullary cancer is by far the most frequent disease of a malignant character to which the testicle is liable. It usually commences in the production of one, two, or more small masses amongst the tubuli, which become gradually destroyed as the morbid deposit increases. The matter is very rarely infiltrated.

The testicle at this early period is extremely full, firm, and hard, owing not to the solid nature of the deposit, but to the excessive distension of the unyielding tunica albuginea. The glandular structure soon entirely disappears, the whole organ being occupied by the new growth, intermixed with and sustained by the septa and fibrous processes from the mediastinum and tunica albuginea. The morbid mass sometimes accumulates in large lobes invested with fibrous tissue. More rarely the disease is first developed in the rete testis. In this case the glandular structure is found at an early period surrounding a solitary deposit in the centre of the tumor, but at a later stage, and even when the tumor has attained a considerable size, the tubuli may be seen expanded in a thin layer around a mass of encephaloid matter. This characteristic appearance is remarked only in those cases in which the cancer originates from the rete testis. As the disease advances the tunica vaginalis becomes distended with serum, not, however, in any considerable quantity. The effusion is caused by inflammation excited by the presence of the encephaloid deposit. It sometimes produces adhesion and partial or complete obliteration of the cavity of the tunica vaginalis. The tough tunica albuginea gradually yields, and allows the mass to accumulate within it to a great size. The morbid growth at length penetrates the fibrous tunic, and a portion protrudes, forming a mass projecting from the body of the tumor. This sometimes occurs in more places than one. The epididymis remains for some time unaffected; but as the disease increases, this part likewise becomes implicated and destroyed. In one instance I found the tubes in the head of the epididymis (the only part of the gland not destroyed) filled with white carcinomatous matter. The scrotum in time becomes fully distended by the diseased mass, which presents the well-known appearances of encephaloid cancer.¹ Small cysts containing serum or a bloody fluid and nucleated cells, are sometimes mixed with the disease.

In diseased testicles of some considerable size, yellow deposits, not unlike in appearance crude tubercular matter, are occasionally interspersed amongst the carcinomatous matter. Similar deposits are observed in encephaloid cancer of the kidney, ovarium, and

¹ I have described only the peculiarities which encephaloid cancer presents in the testicle. For an account of the general and minute characters of the disease, I must refer the reader to the works of Paget, Lebert, and Rokitsansky.

other parts, but not so often as in the testicle. They consist of considerable portions of cancer structure which has undergone fatty degeneration, the cells being withered and imperfect. Masses of enchondroma are sometimes found conjoined with encephaloid growths. The cartilage is probably first developed within the tubes, as in cystic disease of the testicle, although the destruction of the ducts generally renders it difficult to trace the origin of the enchondromatous masses. In a specimen which I examined, the cartilaginous mass was composed of a number of small but distinct portions of enchondroma closely clustered, which in a section resembled very much the little masses commonly seen in cystic disease of the testicle. When the tunica albuginea and scrotum give way, the morbid growth projects as a bleeding fungus. The mass then becomes less firm, and its consistence varies very much in different parts, the morbid matter being in some a mere pulp, or resembling a creamy fluid. It is interspersed with round or irregular patches of dark-looking coagula, and when incised often presents in different places dark minute spots of various sizes, produced by coagulation of blood in the vascular network, usually mixed up with the morbid deposit. On macerating these tumors, or on pouring a stream of water on them for some time, a granular substance, the cancerous matter, is washed away, leaving behind a filamentous shreddy tissue or meshes of a delicate cellular texture, which may often be found connected to a denser fibrous substance, the remains of the tunica albuginea. The spermatic cord is often invaded by a similar substance; and in an advanced stage of the complaint, large bodies of the same kind, originating in disease of the lumbar glands, are found on the sides of the vertebræ, reaching as high up as the diaphragm. The abdominal aorta and ascending vena cava become surrounded by them, and are often displaced or compressed. I have known the circulation through the vena cava completely obstructed by the pressure. This vessel has also been found filled with, and obliterated by, encephaloid matter. The kidneys are sometimes encroached upon by the disease. The spine too may be implicated, the bones of the lumbar vertebræ being more or less destroyed by the morbid growth, which, indeed, spares no parts or textures in its progress. The glands in the groin of the side corresponding to the diseased testicle escape contamination more frequently than those in the loins; still they often become affected.

tude and figure of a hen's egg. Castration was performed, but the patient lived only six months afterwards. The lumbar glands, lungs, and dura mater were found affected with the same disease.¹ The Museum of the College of Surgeons contains a medullary testicle removed from a child only seven months old (No. 2401). The disease, as I have already remarked, more commonly occurs in the middle period of life, or between the ages of twenty and forty; but I have met with it at a much more advanced age. A patient died in the London Hospital, of carcinoma of the testicle at the age of sixty; and I once had under my care a man, aged sixty-four, whose left testicle formed a tumor the size of a large orange, which had been coming about six months. The glands in the groin were enlarged, and the left leg was œdematous. The disease afterwards made rapid progress. The testicle and swellings in the groin increased to a great size: the scrotum ulcerated, and a bleeding and sloughing fungus protruded. The man died about two months after I first saw him. It very rarely happens that both testicles become affected; and in this case the right, though completely enveloped in the morbid deposit, was found after death quite sound.

There are few organs in which the origin of soft cancer can be so frequently and distinctly referred to some injury of the part as the testicle. In these instances we must assume that the constitution was predisposed to the disease, but that the local injury stirred up the morbid action, and determined the seat of its manifestation.

Symptoms.—The disease commences in an enlargement, with considerable induration of the body of the testicle, which preserves its oval form and even surface. The enlargement is attended with slight tenderness, a dull pain, and occasionally with a little effusion into the tunica vaginalis. The growth of the morbid deposit varies, and is very unequal. It is sometimes very slow, the disease making but little progress in several months; at other times it increases rapidly. Its growth is liable to be accelerated by a slight blow or exercise. As the gland enlarges it becomes uneven, loses, too, its indurated character, and softens, but more so in one part than in another, and acquires an elastic feel. As the disease advances the pain increases, but still amounts to little more than a dull sense of weight extending up to the loins, and is sometimes quite absent.

¹ Catalogue of Preparations, p. 372.

The spermatic cord becomes thick and full, owing to the enlargement of the various bloodvessels. The scrotum is at first unaltered; but as it becomes distended by the increasing size of the tumor, its veins are obstructed, and appear swollen and varicose. By this period the glands in the lumbar region usually become diseased and enlarged, and the lower extremity of the side affected swells from œdema.¹ The surgeon may in a short time, especially in a thin subject, distinguish the swellings on the sides of the spine by making pressure over the abdomen. The pains in the loins and abdomen soon become constant, and the patient's sufferings are altogether much increased. The general health, which was at first but little affected, now exhibits a material alteration. The patient loses flesh and strength, his countenance assumes a peculiar sallow hue, his tongue is furred, and his appetite and digestion are more or less impaired. As the enlargement goes on the scrotum becomes adherent to the tumor in one or more places; then ulcerates, and allows the protrusion of the morbid mass, which projects as an open bleeding fungus, discharging a thin fluid mixed with blood, and having a disagreeable faint odor. The disease then makes very rapid progress; the fungus spreads; sloughs form on its surface; coagula separate; bleeding repeatedly occurs; and the patient at length sinks, dying from the drain on the system, or from the interference of the morbid deposit with the functions of the important internal organs. Mr. Paget estimates the average duration of life of persons with medullary cancer of the testicle, at about twenty-three months.

The diseased testicle usually attains a large size without the appearance of a bleeding fungus, as the scrotum admits of great distension before ulceration ensues. In the Musée Dupuytren in Paris, there is a wax model of a scrotal tumor produced by a cancerous tumor of the testicle, of enormous size, without any breach of surface. Mr. Wardrop remarks, indeed, that in no case has he even been able to learn that the integuments have given way, and a fungus grown from the diseased testicle; and Sir B. Brodie likewise states that it has not fallen in his way to observe a tumor in this advanced stage.² At p. 266, I have briefly related the particulars of a case that came under my notice, in which the disease

¹ In a case related at p. 275, the swelling of the lower extremity occurred after castration on the side of the sound testicle. The lumbar glands on both sides were found diseased after death.

² London Medical Gazette, vol. xiii, p. 408.

extended so as to produce a bleeding fungus; but as the testicle is usually removed before the disease reaches this point, it is rarely that an opportunity is afforded to the surgeon of witnessing it. Besides, as the scrotum admits of very considerable distension without ulceration being induced, the patient's life may be destroyed by a similar affection of the internal organs before the skin gives way. In the case of the old man who died in the London Hospital to which I have referred, life was destroyed by internal disease before even the tunica albuginea had given way. The disease in the lumbar glands generally causes but slight pain and inconvenience, yet in some instances the suffering is severe from pressure produced by the morbid mass on the lumbar nerves. Sir B. Brodie mentions the case of a gentleman whose testicle was removed for this disease. He afterwards became completely paralyzed, and on examination of the body, a large tumor in the loins was found to have affected the vertebræ, and to have pressed on the medulla spinalis. Cruveilhier has also recorded the case of a man, aged twenty-seven, whose testicle was extirpated on account of malignant cystic sarcoma. The disease did not return in the part, but made its appearance in the body of the sixth and seventh cervical vertebræ and the posterior extremities of the two first ribs, and caused death by pressing on the medulla spinalis, and producing paralysis of the parts below.¹

There are many cases on record of carcinoma affecting testicles retained in the groin. Some of these are noticed in the chapter on castration. Mr. Pott met with a case in which the disease proceeded to ulceration. There was a large sore with high callous edges in the right groin of a man fifty-five years old. After death the lumbar glands, liver, and right kidney were found affected with the same disease.²

Diagnosis.—Encephaloid cancer of the testicle may be confounded with hydrocele, with hæmatocele, with the cystic disease, and in its early stage with chronic orchitis. It differs from hydrocele in being of an oval shape; in its sides being somewhat flattened; in the circumstance that the enlargement takes place uniformly, and not from the bottom, as in hydrocele; in the uneven surface of the swelling; in the absence of transparency; and in the greater weight of the tumor when balanced in the hand. Encepha-

¹ Anatomie Pathologique du Corps Humain, liv. v, p. 1.

² Works, 4to. Edin. p. 357.

loid cancer, when handled, gives an indistinct feeling of fluctuation, which has often proved very deceptive, and puzzled the most experienced surgeons. By a careful examination, however, the difference may generally be detected, as the consistence and obscure sense of fluctuation vary in different parts, the tumor being softer in one place than in another. A hæmatocele, especially if the sac be much thickened, is more difficult to be distinguished from this disease than a hydrocele, the tumor being heavier and wanting transparency, and fluctuation being very obscure or imperceptible; circumstances in which I have stated that the encephaloid disease differs also from hydrocele. The other distinguishing marks mentioned, together with a patient inquiry into the history of the case, will generally enable the practitioner to distinguish these two affections. In a case of difficulty, all doubt might be set at rest by a puncture with a trocar or lancet. If the swelling should happen to prove carcinomatous, there would be a flow of blood, and perhaps an escape of a small quantity of brain-like matter. But, in general, the bleeding soon ceases. Sometimes the great vascularity of the tumor causes a free discharge of blood, but then it flows of a bright color, and is not attended with a corresponding decrease in the size of the swelling, as in hæmatocele. Encephaloid cancer may very readily be mistaken for the cystic disease, before at least the former arrives at that stage when no prudent surgeon would contemplate an operation. The tumor caused by the malignant disease makes more rapid and more variable progress, and its surface is less even, and its consistency less uniform than cystic sarcoma; but in other respects, the characters of the swelling in these two diseases are so similar, that no certain directions can be given for distinguishing them. The necessity for making the distinction is perhaps less, since in both cases no other treatment is of service but an operation; after which an examination of the diseased organ will afford the surgeon the opportunity of pronouncing an opinion as to the security obtained from future disease. Very great difficulty is experienced, in distinguishing encephaloid disease, in its early stage, from the enlargement produced by chronic inflammation of the body of the testicle; and, as the success of an operation in malignant disease, depends very much upon the period at which it is performed, it is of no slight importance, that the nature of the affection should be detected as early as possible. As there are no ex-

ternal marks that can be relied on for distinguishing the two diseases, the only course that can be adopted is to exhibit mercury so as to make the gums slightly sore; when, if the induration and enlargement should happen to depend on chronic orchitis, the gland will gradually begin to soften and diminish, and if the remedy be persevered in a little longer will be restored to its natural state. If, on the contrary, no change ensue, or if the testicle continue rather to increase in bulk, it may be pretty certainly concluded that the alteration in structure is of a malignant character, or that it results from a disease for which there is no remedy but the knife, and we should therefore be justified in recommending an operation. I have already related (p. 235) a case of difficult diagnosis in which this course was pursued with advantage.

The following example will serve to illustrate some of the difficulties of the diagnosis in these cases, and to point out the kind of careful investigation necessary to enable the surgeon to form a correct opinion respecting the nature of the disease.—A healthy-looking man, aged thirty-four, married, and by trade a carpenter, applied for relief on account of a chronic enlargement of his left testicle. About nine or ten months previously he first perceived an increase in the size and weight of the organ, which occurred without any apparent cause or the receipt of any injury to the part. He continued at his occupation, taking little heed of the swelling, until at length becoming alarmed by its increasing to seven or eight times the size of the other testicle, and experiencing considerable inconvenience from its bulk and weight, he was induced to seek surgical assistance. There was a large tumor occupying the left side of the scrotum. It was of an oval form; its surface was pretty even, except at the upper and front part, which had a slight, smooth, and round projection. The skin covering the swelling was sound, and not adherent; but the subcutaneous veins were a good deal dilated. The consistence of the swelling generally was about that of a hæmatocele; but then it was unequal, being firmer in front than at other parts. On seeking for fluctuation, the obscure sensation produced was more like the resilience of a soft elastic solid than the displacement of a fluid. The small projection above, however, communicated a more evident feeling of fluid. The weight of the tumor was greater than that of a hydrocele, but might be about that of a hæmatocele or a soft solid growth. The

swelling was not transparent, and had little sensibility, firm pressure causing merely a dull pain. The testicle completely escaped detection: it could be distinguished neither by its form or consistence, nor by the character of the pain usually experienced from compression. The spermatic cord was full and large, but otherwise natural, and it passed to the posterior part of the tumor. The lumbar and iliac glands appeared to be free from disease. The important internal organs performed their functions properly, and there was no indication of a morbid state of constitution. Such, then, were the characters of the tumor, and the symptoms by which it was to be ascertained whether the disease was a hydrocele with thickening of the investing tunics, a hæmatocele, cystic sarcoma, or encephaloid cancer. Against the supposition of a hydrocele there was the oval shape, uneven surface, greater weight and irregular consistence of the tumor, the absence of transparency, and the impossibility of detecting the testicle by firm pressure at the part where the gland is usually found in cases of effusion into the tunica vaginalis. Opposed to the idea of a hæmatocele there was not only the irregular surface, varying consistence, and impossibility of detecting the testicle by pressure; but also the mode of growth, the tumor in hæmatocele being of sudden or rapid formation, more often occurring from some injury, and when formed afterwards remaining little altered for a considerable period: whereas in this case the swelling arose spontaneously, took nine or ten months to acquire its large size, and still continued to increase. It was concluded, then, that the tumor must be either cystic sarcoma or encephaloid cancer, its mode of formation, shape, size, weight, and general consistence, and the state of the cord, being such as might correspond to either of these two diseases. The irregularity in the surface and consistence of the swelling, and the large development of the subcutaneous vessels, induced me to incline to the opinion that the growth was of a carcinomatous character; and such proved to be its nature when the tumor was removed after an exploring puncture. There was no trace of the glandular structure of the testicle remaining; but the epididymis was sound, and situated at the upper part of the tumor, surrounded by the tunica vaginalis, which contained about six drachms of serum, and formed the indistinctly fluctuating projection observed at this part.

But great as are the difficulties of the diagnosis with the testicle in the scrotum, they are so much increased when the diseased organ is retained in the groin, that it is almost impossible to pronounce a positive opinion of the nature of the tumor without an exploratory puncture or incision. A surgeon of sound judgment, Mr. Arnott, in describing a case of the kind,¹ states that he was unable to determine its precise nature, whether hydrocele or hæmatocele with a thickened tunica vaginalis, cystic sarcoma, or malignant disease; and he quotes a case communicated to him by Mr. Hodgson, in which equal difficulty was experienced in deciding on the nature of a large tumor in the groin. The patient was seen by Sir B. Brodie, Mr. Key, Mr. Stanley, and others, all of whom coincided with Mr. Hodgson in the opinion that the case was most probably an undescended and diseased testicle; but they could not determine its nature. I have already alluded (p. 84) to a case recorded by Dupuytren of tumor in the groin formed by a collection of fluid around a retained testicle, carcinomatous and much enlarged. The diagnosis was rendered extremely puzzling by the varying state of the swelling. There was an opening into the abdomen which allowed the occasional descent of a hernia, whilst the enlarged epididymis formed a valve at the entrance of the ring, which prevented the surgeon returning the fluid into the abdominal cavity.

Treatment.—In a disease of so fatal a tendency as encephaloid cancer, the only alternative left when it attacks the testicle is an early amputation of the organ. Unfortunately this resource is exceedingly liable to fail, for the disease generally manifests itself afterwards in the lymphatic glands connected with the testicle, in the wound, or in some internal organ. Indeed, so unsuccessful has the operation proved, that the propriety of having recourse to it in any case has been called in question. Sir A. Cooper, whose experience was very great, has recorded five cases, in all of which the disease returned after the operation. He has not mentioned one in which the patient survived for any lengthened period.

But although every practical surgeon acknowledges that the removal of a testicle affected with soft cancer cannot be undertaken in any case, with much hope of the patient remaining long free from a recurrence of the disease, still there are several reasons

¹ Medico-Chir. Trans. vol. xxx, p. 10.

why it is greatly to his interest that the part should be excised. In the first place, there is a chance, small indeed, but still a chance of the disease being limited to the testicle, and being got rid of by the operation.—In April, 1845, I excised the right testicle of a gentleman, aged forty-four. It had been enlarging for two years, and the disease was attributed to an injury. Sir B. Brodie was consulted, and recommended the operation; but owing to the duration and size of the tumor gave little hope of a favorable result. On dissection and microscopic examination of the organ after removal, it was found to exhibit the characters of carcinoma.¹ This patient has since remained under my observation, and at the present period, more than ten years after the operation, he is in good health.—January 2d, 1851, I removed the left testicle of a farm-laborer, twenty-seven years old, in the London Hospital. The organ had been rapidly enlarging for about four months. It was a well-marked specimen of soft cancer, and presented some yellow patches of degenerated carcinomatous matter. This man resides at Leytonstone, where he was quite recently at work in excellent health.—In 1846, Mr. Meade, surgeon of the Bradford Infirmary, removed the testicle of a gentleman, forty years of age, on account of a chronic enlargement which had existed about nine months. The diseased gland appeared to Mr. Meade, and to Mr. Teale, who assisted at the operation, to present well-marked characters of encephaloid disease; and the morbid matter, on minute examination, exhibited nucleated cells elongated and fusiform in shape.² In a note which I received in January, 1854, nine years and three months after the operation, Mr. Meade states that “the patient continues free from any return of the disease, and in a good state of health.”—In October, 1841, Mr. Cæsar Hawkins excised the testicle of a gentleman, aged forty-five, which had been diseased for two years. There was no hesitation in considering it a specimen of medullary disease. The tumor was injected, and is preserved in the Museum of St. George’s Hospital, where I have recently examined it with Mr. Gray. We found no reason to question the view originally taken of the nature of the disease. It con-

¹ The specimen is preserved in the London Hospital College.

² This case is recorded in the London Medical Gazette, vol. xlv, p. 702, 1849. I lately had an opportunity of examining the testicle. Though preserved in spirit, it was too decomposed to enable me to form a fair opinion of the nature of the disease. The appearances, however, were such as to sustain the view that it was soft cancer.

sisted of a mass of encephaloid matter, with large patches of yellow degenerated carcinomatous matter. In 1853 this patient was living, and in good health.

In these four cases, the true nature of the disease was satisfactorily determined, by examination of the part after its removal. In the second case, the period which had elapsed since the operation (nearly five years) is limited; but the early age of the patient, and the rapidity with which the disease was advancing, would lead us to anticipate its early recurrence, if it were not eradicated from the system. It would thus appear that an encephaloid tumor of the testicle has, in some few instances, been removed, whilst yet a local affection, and that the constitution has escaped the infection. Dr. Baring, of Hanover, who has written an elaborate treatise on this disease of the testicle, gives the history of four cases, in which the operation of castration was performed by Rust, of Berlin; by Langenbeck, of Göttingen; and by Hagedorn, of Stade. In two of these cases a period of five years, in another of three years, and in the fourth of two years, had elapsed since the removal of the testicle; and the patients were still in the enjoyment of perfect health, and had not experienced the slightest return of the complaint.¹

But there are strong reasons, in addition to the chance of eradicating the disease, for recommending castration. The uncertainty of the diagnosis in many instances renders the operation highly desirable. It is often impossible to determine exactly whether an enlargement of the testicle is carcinomatous or cystic, and in the more common form of the latter disease, the innocent, excision insures a cure. I shall have occasion to show in a future chapter that castration is an operation attended with very small risk to life. I have never lost a patient from it, and recovery is generally speedy, so that objection can seldom arise on the score of danger from the knife. And if, as most commonly happens, the disease should return, the operation, when performed sufficiently early, undoubtedly tends to prolong life, and perhaps to save the patient the horrors and sufferings of external cancer; for death from internal disease is less distressing and painful than from an open fungoid sore. But castration should never be undertaken when the lumbar glands are enlarged, because the recurrence of disease will be

¹ Ueber den Markschwamm der Hoden, Göttingen; also British and Foreign Medical Review, vol. i, p. 477.

speedy, and the operation will not have the effect of prolonging life. A careful examination, therefore, should be made beforehand; and if, by pressure on the abdomen at the sides of the lumbar spine any solid swellings can be detected, or if either of the lower extremities be found œdematous, no operation should be recommended. When, however, castration is performed before the manifestation of internal disease, it rarely fails to prove beneficial. Its advantages, in promoting the comfort and welfare of the patient, are well shown in the following case.—In October, 1849, I saw, with Mr. Iliff, of Kennington, an eminent barrister, aged fifty-one, who had a solid enlargement of the right testicle of a questionable character. He had previously consulted Mr. Lawrence, who had recommended his taking mercury, in which advice I fully concurred. Our patient took it until his mouth became sore, without any diminution in the size of the tumor. We then recommended castration, and this advice was strengthened by the opinion of Sir B. Brodie. The operation was performed by Mr. Lawrence, in December, 1849, and the recovery was rapid. The disease proved to be encephaloid cancer. Our patient continued well until December, 1851, when pains occurred in the back, and his left lower extremity shortly afterwards became œdematous. He died in May, 1852, of disease of the lumbar glands on both sides of the spine. This gentleman remained in good health for two years after the operation, during which period he was largely engaged in the arduous duties of his profession. He continued, indeed, to go circuit until a few weeks of his decease. Had no operation been performed, it cannot be doubted that he would not have enjoyed health for two years, and continued the practice of his profession for two and a half to the great advantage of his family, but would have been disabled and destroyed at a much earlier period.

A return of disease after operation is seldom delayed so late even as in the preceding case.¹ The following remarkable case is

¹ Mr. H. Ludlow composed the following Table, consisting of 8 cases of his own and 15 of Lebert's, in order to show the period at which the disease recurs after operation.

[illegible]

regarded by Mr. Paget¹ as an instance of its tardy recurrence. J. R., aged thirty-nine, had his right testicle removed by Sir A. Cooper on account of medullary disease. The left had never descended. He enjoyed good health afterwards for nearly twelve years, when he fell off, and after an illness of nine months, attended with sickness and constipation, sank. On examination of the body, a white fungous mass, about the size of a large Seville orange, situated in front of the bladder and connected by a narrowish pedicle to the glands on the left side of the spine, was found to constrict the descending colon. The left testicle was not discovered. The glands on the right side were healthy. Mr. Paget, to whom I am indebted for the above particulars, states, in a note to me, that "he has no doubt that the diseased structures were cancerous." The occurrence of the disease in connection with the lumbar glands on the opposite side to that from which the testicle was removed, together with the late period of the formation of the internal tumor, leads me to the opinion that the pelvic growth was a new development of cancer, and not the result of contamination from the former disease, of which the germs had long remained dormant. It seems highly probable also, that the internal carcinomatous tumor was a disease of the retained testicle, which, it appears, was not discoverable at the examination.

SECTION III.

Melanosis has been observed in the testicle in only a few instances.

Cruveilhier relates the case of a man who died at the age of forty-six of melanosis affecting the hand, lungs, heart, stomach, and other parts.² The right testicle contained a little of the same matter, and the left a deposit the size of a nut. Some years ago Mr. Stanley removed from a man, aged thirty-eight, a patient in St. Bartholomew's Hospital, a testicle affected with medullary and melanotic cancer. The disease soon reappeared, and destroyed the patient. The Norwich Hospital Museum is said to contain a specimen of this rare disease.

¹ Lectures on Pathology, vol. ii, p. 408.

² Anatomie Pathologique, liv. xxx, pl. 3 and 4.

SECTION IV.

CARCINOMA OF THE TUNICA VAGINALIS.

Carcinoma has, in some few instances, been found to originate from the tunica vaginalis, the glandular part of the testicle remaining unaffected. An important peculiarity in these cases is the circumstance that the effusion of fluid into the vaginal sac, to which the disease gives rise, renders it extremely difficult to ascertain its real character at the early period at which an operation would be desirable. The following case is recorded by Sir Everard Home.¹ In December, 1781, a gentleman felt an uneasy sensation in the scrotum. On examining it he perceived the left testicle swelled, with a small degree of hardness to the touch. He immediately applied to a surgeon, who told him that the disease was a hydrocele, and advised him to let it alone till it became large, when an operation would cure him. From that time to March, 1782, the swelling gradually increased, the pain became acute, and the hardness increased. About this period two other medical gentlemen saw him; they were of opinion that the disease was complicated, and by no means a simple hydrocele; therefore desired him to do nothing for a fortnight or three weeks, and then they would see him again. In the mean time he applied to a surgeon noted for curing this complaint, who made two or three punctures for the palliative cure of hydrocele, assuring the patient that the disease was of that nature. On finding a failure of the good effects which had been promised, he again applied to his former surgeon, with the inflammation, pain, and swelling much increased. At this time Mr. Hunter was called in, and it was thought advisable to open into the tumor, to ascertain the real nature of the disease, and then to proceed accordingly. This was done; and, on examining the substance of the tumor, it appeared to be composed of a thick coat, within which was a grumous and gelatinous substance. From this appearance of the tumor it was thought advisable to remove the whole, which was immediately done. Some of the skin, which was diseased and adherent to the fore part of the tumor, was also removed. The tumor was found to consist of a thickened tunica vaginalis, filled with a firm coagulum of blood, which in some parts,

¹ Observations on Cancer, p. 125.

had lost its red particles, the whole appearing like a mottled swelling; and the testicle entire in the posterior part, only appearing to be squeezed into a smaller size than natural, from the pressure of this substance in the tunica vaginalis. The parts healed up readily, but some months after a swelling of the abdomen was observed. This increased, and he became weak, hectic, and died. On examination of the body, large masses were found extending up the left side along the back, as high as the diaphragm. The epiploon appeared to have a large mass in it, connecting the colon, stomach, and other viscera together. The liver was studded full of small tumors of the same structure; and the spermatic cord out of the belly had become thickened in the same way. Sir A. Cooper has described a somewhat similar case.

In the Hunterian Museum there are two examples (Nos. 2462, 2463) of encephaloid disease of the spermatic cord, the testicle being unaffected. One of them occurred to Mr. Hunter, who gives a history of the case, showing that the disease originated in the cord. The patient died from cancer in the abdomen, implicating the lumbar glands and omentum.

CHAPTER IX.

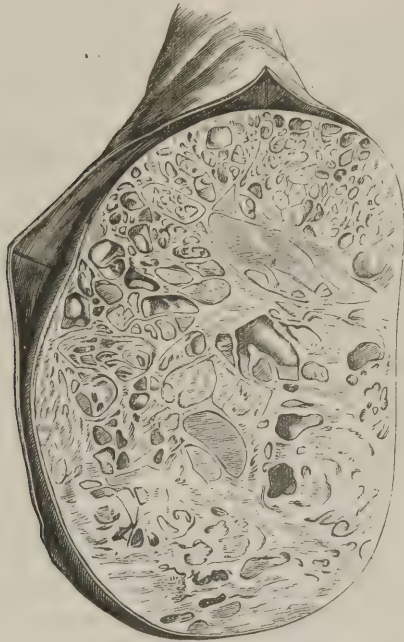
CYSTIC DISEASE OF THE TESTICLE.

IN this rare affection, commonly called *Cystic Sarcoma*, a tumor formed of compound or proliferous cysts is developed in the testicle.

The morbid mass is developed within the tunica albuginea, which is generally a good deal thinned. The cysts of which it is composed vary very much both in number and size, and in the nature of their contents. They may be only a few in number, or they may exist in a countless multitude. They vary in size from that of a millet seed to the dimensions of a pigeon's egg, and are composed of a smooth membrane closely adherent, and containing a transparent light-colored fluid, or a fluid which is thick, viscid, and albuminous, or tinged with blood, and they are sometimes filled with coagula. The cysts are imbedded in a fibro-connective or

fibrous tissue more or less dense, fibrinous plastic matter being often interposed between them. In cysts which have attained a large size, growths are frequently observed springing from the walls, and

Fig. 40.

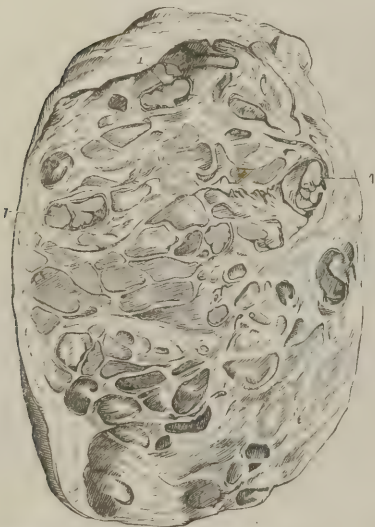


Section of a cystic tumor of the testicle, showing a multitude of cysts of various shapes and sizes, with solid matter interposed between them. (From a specimen in the Museum of the College of Surgeons, No. 2389.)

occupying more or less of the cavities. Some of these assume a polypus form; others have a lobular shape. In external appearance they resemble very much the intra-cystic bodies seen in cystic tumors of the breast. On minute examination of the intra-cystic growths in the specimen represented in Fig. 41, made by Professor Quekett at my request, they were found to possess a cellular structure, and to be covered on the surface with cylindrical epithelium, like that covering the villi of the intestine. Small masses of enchondroma are often mixed up with the cystic disease. They are usually of an elongated form, and appear like pearly-looking bodies in sections of the tumors. The tubular structure may generally be found in the form of a thin layer spread over the

cystic growth, or massed on its upper surface, and seated just beneath the thinned tunica albuginea. The gland tissue can be peeled readily from the surface towards the back part where it is

Fig. 41.



Section of a cystic testicle in which the cysts are of larger size than in the preceding figure. (From a specimen in the Museum of the College of Surgeons, No. 2390.) It was removed by operation from a man thirty-three years of age. There was no return of the disease. 1, 1, 1. Lobular intracystic growths. In both figures the tumor is reduced in size about one-half.

attached. The cystic growth is generally separated from the glandular structure by a capsule of dense connective tissue. In tumors of considerable size, the tubular structure sometimes entirely disappears. The epididymis is at first unaffected, but becomes wasted and lost as the growth increases.

The tumor produced by the cystic disease sometimes attains a great size. The specimen represented in Fig. 40 measures five inches in its long diameter, and three inches in its transverse.¹

Considerable doubt has long existed in respect to the nature and mode of origin of this disease of the testicle. Sir A. Cooper, who described it under the name of "hydatid disease," evidently supposed that

the cysts might be formed of enlarged and obstructed tubuli; for he remarks, "although at first sight they appear to be cysts, yet when traced they are not distinct bags, but send out solid processes by which they are connected with other bags."² In this opinion, I was disposed to concur, the disease appearing to me to be analogous to the cystic tumors of the breast which originate in a morbid dilatation of the lactiferous tubes. But having subsequently observed in several specimens of cystic testicle healthy tubuli seminiferi forming a layer spread over the morbid mass,

¹ The Museums of the College of Surgeons, and of the London, St. Thomas's, and St. George's Hospitals contain fine specimens of this disease.

² Observations on the Diseases of the Testis, p. 83.

generally at its upper part, I was at a loss to reconcile the tubular origin of the disease with this condition of the organ, until the difficulty was solved by careful inquiries which I made in a case favorable for investigation, owing to the early stage of the cystic development.

In December, 1852, a man, aged thirty-seven, consulted me on

Fig. 42.



Seminal tube terminating in a dilated pouch (130 d.)

Fig. 43.



Lateral dilatation of a tube filled with dark granular matter (250 d.)

account of an enlargement of the testicle, which was first observed about seven months previously. Having no doubt that the disease was either carcinomatous or cystic, I recommended its removal, and per-

formed the operation. The patient recovered favorably, and has since remained quite well. On making a section of the tumor, I found the tubular structure spread over a part of its surface just beneath the thinned tunica albuginea. The morbid mass was a marked specimen of cystic disease.

Some of the larger cysts measured half an inch in diameter, but the majority were much smaller, and many were no larger than millet seeds. A great many of the cysts contained a transparent limpid fluid, others a bloody fluid, a few coagulated blood, and several a solid whitish opaque matter. The cysts were imbedded in fibrous tissue, which was particularly dense towards the centre of the growth. On examination of thin slices of the tumor in the microscope, the origin of the cysts in a dilatation of tubes was clearly made out. Thus, in some specimens, a tube could be traced to a termination in a dilated pouch (Fig. 42). In others a cyst appeared to arise from a lateral dilatation of a columnar tube, or at the extremity of a loop (Fig. 43); whilst in others the dilatation appeared to be uniform. These dilated tubes and cysts were lined

by a tessellated epithelium, and many of them contained a dark granular matter. The opaque whitish substance found in several of the larger cysts consisted chiefly of a mass of modified tessellated epithelial scales, and corresponded to what is called cholesteatoma. No spermatozoa were detected in any of the cysts or morbid tubes.¹

The minute examination of this specimen fully establishes the origin of the cysts in a morbid condition of the ducts. The circumstance of the healthy tubular structure being found external to the morbid growth, shows that the ducts affected are not the tubuli seminiferi. If the latter were the seat of the disease, we should expect to find the tubes which remained sound, pushed to one side, or at any rate near, or mixed up with, the diseased ducts, and not spread over the surface and distinctly separated from the morbid growth. Nor can the diseased ducts be those of the epididymis, for I have invariably found this part unaffected or wasted and lost in the morbid mass. If the disease sprang from the tubes of the epididymis, the tubular structure of the gland, unless destroyed by pressure, would certainly be found in a mass enclosed in its own tunics, distinct from the morbid growth, and not extended over its surface.

It being clear, then, that neither the tubuli seminiferi nor the ducts of the epididymis are the tubes which undergo the changes constituting the cystic disease, its seat may be considered as conclusively traced to the ducts of the *rete testis*. Why they alone are subject to the morbid change, I admit my inability to explain.

I have remarked that small masses of enchondroma are frequently mixed up with the cystic growth. It is clear from recent observations that the enchondroma is originally formed within the tubes and their cystic dilatations. I have examined with Professor Quekett several specimens of cystic testicle in which the intratubular development of the cartilage was quite manifest. The cartilage occurs in elongated portions, which are easily detached from the cysts enclosing them. Enchondroma may be developed so abundantly as to encroach upon and obliterate the cysts, and to form the chief bulk of the tumor. This appears to have been the

¹ A fuller account of these investigations, illustrated by plates, will be found in a paper communicated to the Medico-Chirurgical Transactions (vol. xxxvi, p. 449). These observations have since been confirmed by examination of another specimen of the disease.

case in a testicle excised by Mr. Hancock, which I have had an opportunity of examining. It weighed four pounds six ounces, and is the largest cystic testicle I have met with. The development of the cartilage within dilated tubes in this specimen is described and figured by Mr. Hogg in the Transactions of the Pathological Society.¹

The minute examination of these cystic tumors shows the non-malignant character of the disease, which, moreover, is fully confirmed by the accounts of those cases in which the history has been preserved, patients having lived many years after the excision of the organ, and died of a different disease. Yet cases occasionally occur, which strongly tend to shake our confidence in this conclusion. Some years ago a medical friend, aged thirty-two, was attacked with disease of the testicle. It continued to increase in size, and at the end of eighteen months was excised. On a cursory examination of the tumor, I found it to exhibit the ordinary appearances of cystic disease, blood being, however, extravasated in two or three places, which was attributed to some exploratory punctures made previous to the operation. The patient never regained his health, but remained cachectic. In about six months he suffered from hæmoptysis, which was followed by attacks of severe lumbar pain, and subsequently the liver enlarged to a great size. He died eighteen months after the operation. On examination of the body, masses of medullary cancer were found in the lumbar glands, lungs, and liver.

In a visit which I paid several years ago to the Museum of St. George's Hospital, Mr. Cæsar Hawkins showed me two specimens of well-marked cystic testicle which had been removed by operation, the patients having died within two years afterwards of internal tumors, and he expressed to me his opinion that this disease was a malignant affection. I have recently made a careful examination of these preparations. The soft matter from the cysts of both tumors, when placed under the microscope, was found to consist of a mass of nucleated cancer-cells. Some of them contained numerous dark granules; and where the diseased mass was the softest, the granules were more abundant than the cells, the cell-walls in these instances having been most probably destroyed. In some of the masses portions of ducts filled with cells might be ob-

¹ Vol. iv, p. 180.

served. No epithelial scales could be detected in either of the specimens. In one of them there were some small portions of enchondroma.¹

It seems clear from these facts that cystic disease occurs in the testicle in two forms, a malignant and non-malignant, the former being by far the more rare. And if the histological observations be fully confirmed, the presence in the cysts of tessellated epithelium will indicate the character of the non-malignant, and the presence of nucleated cancer-cells the nature of the malignant. We shall thus be furnished with the means of determining a most important distinction in practice.

In describing a malignant form of the disease I do not comprise cases of encephaloid cancer in which two or three cysts may be found mixed up with the cancerous matter, but tumors the great bulk of which is composed of cysts of various sizes. Indeed, in a specimen of this form of the cystic disease which I have recently examined, the appearances so closely resembled those of the non-malignant form of this affection, that it was impossible to distinguish the difference without the aid of the microscope. It seems probable, however, that although in the early stage of the malignant form the cystic structure prevails, that at a later period the cysts become destroyed by the rapid growth of carcinomatous tissue. This had probably occurred in a specimen in the Hunterian Collection (No. 2416). It is a section of a large tumor of the testicle, the upper part of which is composed of a multitude of small cysts, whilst the remainder exhibits the usual appearances of medullary cancer. The patient died of internal cancer a few weeks after the removal of the diseased organ.

In the preceding account of a cystic testicle I have noticed the occurrence, in a few well-developed cysts, of a solid whitish matter, exhibiting the characters of cholesteatoma. I have observed isolated formations of the same kind in other cystic testicles, both malignant and non-malignant. In a diseased testicle removed by Mr. Henry Thompson last April, and kindly sent to me for examination, I found a combination of cholesteatoma, enchondroma, and encephaloma, with cysts within the dilated and thinned tunica al-

¹ Cruveilhier has described and figured a diseased testicle, which appears to have been a well-marked specimen of malignant cystic disease with enchondroma. This case has already been referred to at p. 268.

buginea. The cholesteatomatous matter existed in great abundance, forming with numerous small deposits of enchondroma a portion of the tumor, the upper, distinct from the larger mass below, which consisted principally of encephaloid growths and cysts. The two portions were separated by loose seminal tubes. The tubes between the cysts were in some parts unaltered, and in others dilated and filled with changed cells.¹ The patient, a man aged twenty-five, died about five months after the operation, of medullary cancer of the lumbar glands, lungs, and other internal parts. In this case, also, it seems probable, that the cystic structure was more perfect in the early period of the disease than at the time of the operation.

Symptoms.—The swelling to which the cystic disease gives rise takes place imperceptibly, very slowly and without producing pain. After existing for several months, it occasions a chronic indolent tumor of an oval shape and elastic feel, which is scarcely at all tender or painful. The surface of the tumor is generally smooth and even, but is occasionally irregular. There is sometimes fluctuation consequent on the presence of a thin layer of fluid in the vaginal sac surrounding the cystic growth. When the tumor attains a large size it is inconvenient from its bulk, and unless well supported, it occasions a dragging sensation and uneasiness in the loins. The disease usually commences at the middle period of life: I have not myself met with it later than between the ages of forty and fifty. Its origin is often ascribed to some accidental injury of the part.

Diagnosis.—Cystic disease of the testicle may be mistaken for hydrocele, hæmatocele, and encephaloid cancer. The diagnosis from vaginal hydrocele is extremely easy. The tumor is of an oval shape, not pyriform, as in hydrocele; it feels heavier, and fluctuates less distinctly; and there is an absence of the pain experienced in compressing the part usually occupied by the testicle in hydrocele. The swelling also is not transparent. Notwithstanding these distinctive marks, Sir A. Cooper considered that the surgeon was very liable to err, and he admitted that he had been two or three times mistaken, and had put a lancet into the part expecting to find water issue, and a few drops of blood only have followed. The distinction from hæmatocele is much less marked, as the latter

¹ For fuller particulars of the minute examination of this tumor by Dr. A. Clark and myself, vide *Transactions of Pathological Society*, vol. vi, p. 241.

has a somewhat solid feel, weighs heavy in the hand, is not transparent, and fluctuates less distinctly than a hydrocele. The absence of pain on compressing the back of the tumor will be the best guide to distinguish the cystic disease from a hæmatocele. As I have remarked in the previous chapter, the characters of the cystic disease are in general so similar to those of encephaloid cancer, that I can give no satisfactory directions for distinguishing them. The surgeon must be guided in his opinion by inquiries into the history of the case, and by noticing the condition of the cord, and of the lumbar glands, and the state of the patient's health, which are unaffected in the cystic disease, but are liable to suffer in malignant enlargements of the gland. The tumor produced by the latter affection is also less even and regular, and makes more rapid progress than that occasioned by the cystic disease.

In cases of difficult diagnosis the doubt may, in general, be safely removed by introducing a trocar into the front of the tumor. A hydrocele or hæmatocele will be at once made evident by the free escape of serum or blood, and a great reduction in the size of the swelling. If the case be cystic disease, only a small quantity of serum tinged with blood will flow; and if it be a soft cancer, blood of a bright color will probably escape somewhat copiously without producing any diminution in the size of the tumor. In some instances, the existence of the latter disease may be rendered yet more certain by the detection of cancer-cells in the soft matter or fluid found in the canula after its withdrawal. In performing this exploring operation the surgeon should use a common-sized hydrocele trocar. The bore of the exploring trocar, and the groove of the exploring needle, the instruments commonly used, are not of sufficient size to allow of the ready escape of the grumous blood of an old hæmatocele, or of the matter of soft cancer. The wound of the trocar is quite unimportant. In cases in which an operation is likely to be required, it will often be convenient to defer this exploratory examination until arrangements have been made for further proceedings if necessary.

Treatment.—No kind of treatment, either local or general, is of any service in this disease, the morbid changes being quite beyond the influence of remedies. The only means that can be adopted is the removal of the tumor, which should be performed as soon as the surgeon is satisfied that the disease will not yield to

treatment. The morbid growth should afterwards be submitted to a minute examination, and if no cancer-cells be found, or if the cysts contain tessellated epithelium, he will be able, with some confidence, to assure his patient of his permanent recovery, and immunity from all risk of a relapse.

CHAPTER X.

FIBROUS TUMOR OF THE TESTICLE.

IN treating of atrophy of the testicle, and of the effects of orchitis, I have stated that the gland sometimes undergoes a fibrous transformation, being converted into a fibrous tissue consisting in part of the processes springing from the tunica albuginea, and in part of a metamorphosis of the coats of the tubuli, and of the fibrinous matter exuded between them in inflammation. In some instances the structure into which the organ is converted is a loose fibrous tissue, as in the case of detained testicle related at p. 73. More frequently the texture is close, dense, and firm, somewhat resembling the fibrous tumor of the uterus. Occasionally two or three small cells, containing a serous fluid, occur in the fibrous structure, and in old cases the tissue undergoes calcareous degeneration. In all these instances the testicle is more or less diminished in bulk, generally in a marked degree, and is sometimes reduced to a few filamentous shreds.

Filamentous connective or fibrous tissue is sometimes abundantly developed in other morbid conditions of the testicle. I have described at p. 245 a case of considerable chronic enlargement of the testicle, in which the organ was composed of masses of fibrinous matter, and deposits of pus separated by thick and dense septa of fibrous tissue. In cystic sarcoma, also, this tissue is largely developed, so much so that Mr. Paget, before the tubular origin of the cysts was made out, was inclined to regard the cystic disease as essentially a fibrous tumor in the testicle.¹

But this chapter is intended to comprise cases in which there is more than a transformation of the natural tissue, or the *debris* of

¹ Lectures on Surgical Pathology, vol. ii, p. 137.

the original structure—cases in which there is a new formation of fibrous tissue to a considerable extent without any other important change. For it appears, that in the testicle, as in several other organs, the healthy structure may be supplanted by an entirely fresh formation of this structure, attended with an increase in the bulk of the organ. This pathological change is extremely rare. In Cruveilhier's *Anatomie Pathologique*¹ there is an excellent representation of the disease. The testicle was removed from a patient at the Hôpital Beaujon, by M. Marjolin. It was twice the natural size, and very heavy. It offered a good deal of resistance to the knife, and creaked when cut; and it was entirely composed of a number of grayish-white fibres intersecting each other and arranged in lobules, similar to the fibrous tumor of the uterus.

So far as I know, this fibrous growth is unattended with pain or any peculiar symptoms besides great induration of the whole organ; and the change is one over which neither general nor local treatment can exert much control. Sir B. Brodie mentions, that he extirpated a testicle that had undergone this fibrous conversion; between six and twelve months after the operation the other testicle became hard and enlarged, and apparently affected in a similar way. As an experiment he gave the patient iodine internally, and rubbed the iodine ointment on the testicle also. The hardness became in some degree diminished, and the progress of the disease stopped; and the patient left the hospital with the greater part of the remaining testicle in a sound state. This was no doubt a case of chronic orchitis, and I suspect that the fibrous tumor generally owes its origin to chronic inflammation, the matter exuded in this disease, instead of becoming absorbed, undergoing conversion into this tissue. The fibrous tumor of the testicle is not a disease of a serious character; and as, in general, it produces little or no inconvenience, the extirpation of the gland is rarely required. Mr. Travers mentions a case in which the organ was removed, owing to the person affected being impatient for its extirpation, from apprehension of the disease being scirrhus or malignant.² The gland being quite useless when in this state, there is no particular objection, after other means for the reduction of the induration have failed, to castration, to allay the patient's fears, and to remove a constant source of uneasiness from his mind; but it is not a disease which absolutely requires the operation.

¹ Liv. v, p. 1, fig. 3.

² Med.-Chir. Trans. vol. xvii, p. 327.

CHAPTER XI.

CARTILAGINOUS TUMORS OF THE TESTICLE.

IN treating two important diseases to which the testicle is subject, soft cancer and the cystic, I have had occasion to notice the disposition which often exists in these affections to the development of enchondroma. In the former the cartilage, though sometimes mixed up with the soft cancer, is more commonly found as a distinct mass in its substance, and separated from it by a capsule.¹ In the cystic disease, the cartilage occurs in numerous small isolated masses, which are disseminated throughout the tumor. They are developed within dilated tubes of the rete testis, and the little masses are easily shelled out from the cysts enclosing them. The formation of cartilage in both these instances is subordinate to the other changes, and commonly limited in degree. But enchondroma has been observed in some rare cases so largely developed in the testicle, as to constitute a separate or the principal lesion, and to produce a considerable tumor of the organ. In a case referred to at p. 283, in which a tumor of the testicle weighed four pounds and six ounces, the disease was primarily and essentially cystic; but cartilage was developed in such great abundance as to encroach upon and obliterate the cysts, and to form the chief mass of the tumor. Mr. Paget has recently recorded a remarkable case of cartilaginous growth in the testicle, which presents many points of great interest to the pathologist.² A man, aged thirty-seven, was admitted into St. Bartholomew's Hospital on account of a large swelling of the right testicle and spermatic cord. The diseased parts were excised, and the patient recovered favorably, but he returned to the hospital in about three weeks, much enfeebled and laboring under dyspnœa. This continued to increase until his death,

¹ Baring (Ueber den Markschwamm der Hoden, Pl. 11) has figured an encephaloid testicle exhibiting an isolated mass of cartilage in the substance of the tumor enclosed in a capsule. Mr. Paget also mentions three similar specimens. (Lectures on Pathology, vol. ii, p. 209.)

² Medico-Chirurgical Transactions, vol. xxxviii. p. 247. This interesting case is minutely described by the author with his usual care and clearness, and is well illustrated by figures.

which took place suddenly ten days afterwards. The oval mass occupying the place of the testicle was composed of tortuous cylindri-form and knotted pieces of cartilage, which were from half a line to two lines in diameter, and was closely packed and imbedded in a tough connective tissue. Over parts of the outer surface of the mass a layer of seminal tubes was thinly spread out between it and the tunica albuginea. Surmounting this mass, and separated by a layer of connective tissue, there was a conical mass formed of similar but smaller pieces of cartilage. These were found to be contained in tortuous but communicating canals. Above this second mass a series of smaller cartilaginous swellings extended along the whole course of the spermatic cord. It was evident that the disease consisted chiefly in morbid growths within canals; and dissection (the details of which are minutely given by Mr. Paget) satisfactorily showed that these canals were lymphatics.¹ From the scar of the operation-wound two dilated lymphatics, filled with growths like those in the spermatic cord, passed upwards to a swelling of the size of a hen's egg (probably a diseased lymphatic gland), which on section presented cavities filled with pellucid fluid, and partitioned by fibrous and cartilaginous textures. This swelling adhered closely to the vena cava inferior, and a cartilaginous swelling projected from it into the cavity of the vein. The only other diseased parts were the lungs. Both these organs were enlarged by formations in them of masses of cartilage, in such abundance that the two lungs together weighed eleven pounds and a half. The cartilage appears to have been developed in the rete testis, and its primary seat is supposed by Mr. Paget to have been the lymphatics of the testicle. He considers the case to present the most probable instance he has yet known of "a local disease becoming constitutional," and justly remarks, "The local origin and maintenance of those tumors in the testicle, that contain cartilage without cancer, are well established by the many cases in which no recurrence of the disease has followed their removal, as well as by the cases in which, cancerous growths being combined with the cartilaginous, the recurrent disease has contained cancerous structures alone. In this instance, however, we must assume that the cartilaginous local growths, ex-

¹ I am indebted to Mr. Paget for one section of the diseased mass, which is preserved in the London Hospital College. The other is in the Museum of St. Bartholomew's Hospital.

tending into the blood, infected it. The quantity of cartilage found in the lungs gives a striking illustration of the enormous power of multiplication and increase of such structures, when in free contact with the blood. It may be estimated that, from the germs (if we may so call the material in whatever form) derived from the small growth that projected into the vena cava inferior, nine pounds of cartilage were developed in less than three months." I am not acquainted with any similar case of purely cartilaginous growths in the testicle leading to secondary deposits of a like kind. The case, so far as I know, is unique.

CHAPTER XII.

CALCAREOUS DEPOSITS IN THE TESTICLE.

EARTHY matter is met with in the testicle under two forms: 1. Laminated and often mixed up with fibrous tissue; and, 2, as an irregular amorphous mass. In the first form, it is usually deposited between the tunica vaginalis testis and the tunica albuginea, in little fibro-calcareous patches, similar to these occurring on the pleura.¹ I have frequently found one or two irregularly-shaped projecting bodies of stony hardness, scarcely larger than a pin's head, attached to the tunica vaginalis, covering the upper part of the testicle. Laminated calcareous matter occurs also in old cases of hydrocele, being formed in false membrane lining the outer portion of the tunica vaginalis, where it is sometimes so abundant as to form a complete bone-like cyst. Two well-marked specimens of the kind have been lately shown me by Mr. Spence, of Edinburgh. It has been said that the epididymis alone may be encased in calcareous matter, the testicle being free; but this I have never seen. Earthy matter occurs, however, in the substance of the epi-

¹ 100 parts of earthy matter from the tunica vaginalis, divested of membrane and dried, were found by Mr. Barry to consist of

Phosphate of lime,	45
Carbonate of lime, with a trace of magnesia,	17
Animal matter,	38

didymis, especially in the tail, from calcareous degeneration of the plastic matter exuded in inflammation.

The body of the human testicle is more rarely the seat of earthy deposits. The matter exuded there in inflammation, especially in chronic, may, as in the epididymis, undergo calcareous degeneration. When atrophied and reduced to a mere fibrous tissue, the gland, after a time, becomes the seat of earthy deposits. Small masses of bony matter occur in enchondromatous testicles. The Museum of St. Thomas's Hospital contains a good specimen of mixed cystic and enchondromatous disease of the testicle, with calcareous deposit in the substance of the cartilage. Nothing is known of its history. Mr. Quekett has described in the Catalogue of the Histological Series of the Hunterian Museum (Vol. i, Pl. VII) sections of a cartilaginous tumor of the testicle, each of which exhibits in its centre a small mass of bone. Although the bony matter is of some considerable thickness, it exhibits no trace of bone-cells. Mr. Quekett informs me that he has examined several specimens of bony deposit in this organ, but has never observed any in which bone-cells or lacunæ were present, the bone being in every case of that kind termed false or abnormal.¹

These changes possess, in general, more pathological interest than practical importance. Calcareous deposit in the testicle, however, though existing for a long time in an indolent state, may, at a later period, set up suppurative inflammation, and cause tedious and troublesome sinuses. Two such cases have come under my notice. — A soldier, about seventy years of age, whose left testicle was apparently converted into bone, and felt extremely firm and indurated, was an out-patient at the London Hospital

¹ Calcification of the tubular structure of the testicle has been met with in several animals. A very beautiful specimen from the ram, belonging to a farmer in Wiltshire, has been described and figured by Mr. Joseph S. Gamgee. Another specimen, also from the ram, and formerly belonging to the late Mr. Langstaff, is in the possession of Dr. Crisp. In the collection of drawings by Dr. Carswell at University College, there is the figure of the testicle of a goat in a similar condition. In the two first-named cases the tubuli are converted into calcareous matter, but are of the natural size. The Museum of the College of Surgeons contains the testicle of a bull, in which this change is in an incipient stage, some of the tubuli being perfectly soft and of uniform diameter; whilst others are wholly or partially converted into calcified tubes precisely the same as in the ram. This calcareous change does not appear to have been observed in the epididymis or vas deferens in these animals. I am not acquainted with any instance of calcification of the tubuli in the human testicle.

under Mr. Adams for many weeks, on account of the organ becoming painful and inflamed. After some time it suppurated; and the pus, on being discharged, had the usual offensive smell of an abscess connected with dead bone. The earthy matter came away by degrees in small pieces, which amounted to nearly one hundred, and the patient ultimately recovered with an atrophied testicle. A man, aged sixty-two, came under my care at the hospital on account of a painful swelling and fistulous sinus of the left testicle. He had been affected with acute orchitis twenty years previously, since which the organ had remained enlarged. Two similar attacks had since followed an injury of the part. The last occurred a few weeks before his admission, and ended in an abscess, which had burst, leaving an open sinus. Another abscess formed, which I punctured, and on passing a probe to the bottom of the sac, it struck against a hard substance like bone. Some weeks afterwards I seized this body with the forceps, and endeavored to detach it, but it was too firmly attached to come away. The part was not very sensitive, for the man himself endeavored to remove the hard substance with the sharp end of a common nail, but without success. The fistula continued to discharge thin pus for several weeks, and at length the man discontinued his attendance.

In the second form, the earthy matter is deposited in an irregular mass resembling mortar, and containing very little animal matter, being very similar to the earthy substance found in the lungs and bronchial glands. It is generally met with in the head of the epididymis, and sometimes in the lower part, and but very seldom in the body of the testicle. As I have already stated, this earthy matter results from the degeneration of tubercular matter deposited in the testicle in early life. (See observations at p. 256, and the accompanying figures.)

CHAPTER XIII.

LOOSE BODIES IN THE TUNICA VAGINALIS.

Loose bodies are occasionally found in the cavity of the tunica vaginalis. They are small in size, and of an oval flattened shape; and their surface is smooth and polished. Their texture is in most instances elastic and homogeneous, or arranged in concentric laminae, and consists of a fibro-cartilage, or, as Lebert states, of a

tissue resembling the elastic coat of the arteries. Ossific deposits are often found in them, indeed the loose body is sometimes entirely composed of bony matter. On examining a thin lamina of one in the microscope, I found well-defined bone corpuscles. Richter, of Göttingen, met with three round bodies in the tunica vaginalis, which were quite hard, and of the size of a very large hazel nut; but they rarely attain so large a size as this.¹ They seldom exceed three in number; and they occur generally in combination with hydrocele, the loose bodies being the original disease, since in their movements in the cavity of the tunica vaginalis they promote a greater secretion of fluid from the serous membrane, in the same way as a loose cartilage in a joint excites an increased synovial secretion from the membrane by which it is lined. In some cases the surface of the tunica vaginalis is found thickened and uneven.

The manner in which these loose bodies originate does not differ essentially from the mode of development of loose cartilages in the interior of joints. Deposition takes place beneath the tunica vaginalis testis, which is gradually protruded until the fibro-cartilaginous or ossific body forms a pendulous tumor, which, being attached merely by a slender stalk, is accidentally separated in the motions of the testicle, and is thus left loose in the cavity of the tunica vaginalis. These bodies have been observed in the various stages of their development. The Museum at Fort Pitt, Chatham, contains a testicle with a small fibro-cartilaginous body hanging by a peduncle from the head of the epididymis; and also four other small bodies which were found loose in the vaginal sac. In a loose substance of the size of a small grape, of firm consistence, and possessing a bony nucleus, found in a case of hydrocele, Morgagni noticed a short and slender neck by which it had been adherent.² But in general there is no trace of the original attachment left on either the loose body or the tunica vaginalis. I have seldom observed these bodies except in connection with hydrocele. If present without the effusion of fluid, they admit of being moved around the testicle, and may in this way be readily detected. If inconvenient, the loose body might be pinched up and taken out by a small incision in the scrotum and tunica vaginalis. Chassaignac exhibited to the Surgical Society of Paris, a loose body, about three-quarters of an inch in length and half an inch in breadth,

¹ Medical and Chirurgical Observations, tr.

² Cooke's Morgagni, vol. ii, p. 429.

which he had excised from the vaginal sac during life. It is described and figured by Lebert.¹

CHAPTER XIV.

FETAL REMAINS IN THE TESTICLE AND SCROTUM.

THE remains of a foetus have, in some rare instances, been found in the scrotum in connection with the testicle. Dr. Verneuil, of Paris, has collected and carefully analyzed all the recorded cases which he has been able to meet with, and as no instance of the kind has fallen under my observation, the substance of this chapter will be taken chiefly from his able and elaborate paper,² recently published, to which I must refer the reader for fuller information on the subject. The cases collected by Dr. Verneuil are nine in number, and to these he has added one of great interest, observed by himself and M. Paul Guersant. The description of some of them is extremely concise or very imperfect. The two best observed examples are—the author's, in which, amongst other elements foreign to the part, such as skin and cartilage, he recognized the gray matter of the brain,—and Velpeau's well-known case of a man, twenty-seven years of age, from whose scrotum he excised a congenital tumor, which was found to be occasioned by the presence of nearly all the anatomical elements of a foetus.³ Of the ten cases, the side was noted in six, and in all of these was the right—a preference which has been also remarked in tumors of the ovary containing foetal remains. It was supposed by Velpeau and Ollivier, that in all these cases the inclusion⁴ is originally

¹ *Traité d'Anatomie Pathologique*, p. 175.

² *Archives Générales de Médecine*, 5e série, t. 5 et 6, 1855. But two cases have been observed in Great Britain which I know of. Dr. Duncan, of Edinburgh, removed a congenital tumor of the testicle from a boy eight years of age. Dr. Goodsir, who examined the tumor, found skin, hairs, and portions of cartilage in it. (*Vide Northern Journal of Medicine* for June, 1845.) Mr. Erichsen (*Science and Art of Surgery*, Am. Ed. p. 891) has briefly alluded to a case which occurred at the University College Hospital in 1852. A testicle, about the size of an ostrich's egg, was removed, by operation, from a man thirty years of age, by Mr. Marshall. The patient had been affected with the tumor from early infancy. It was found after removal to be composed of a large cyst filled with an oily fluid, like melted butter, which solidified on cooling. The cyst contained some foetal debris, but of what nature is not described.

³ *Gazette Médicale de Paris*, Fév. 15, 1840.

⁴ The reader will understand that the word "inclusion" signifies a form of double

abdominal; that is to say, that the organic *debris* are first situated in the abdomen along with the testicle, and accompany the organ in its progression out of that cavity. Dr. Verneuil dissents from this opinion, and shows that, although in some instances the tumor is originally foreign to the scrotum, and is formed in intimate connection with the testicle before its transition, in other cases, the tumor is first developed in the subcutaneous tissues of the scrotum, independently of the testicle, though it commonly becomes connected to the gland in the process of growth. He believes, indeed, that the inclusion is commonly *extra-glandular*. But in whatever situation the tumor is developed the testicle generally suffers, becoming atrophied, or more or less altered by inflammation. The tumor remains indolent for a variable period, growing with the body, but afterwards enlarging until it attains in some instances an immense size. At length inflammation is set up, an abscess forms, and ends in fistulous openings, from which the foetal *debris* are discharged. This may occur in infancy, or be delayed till a later age, even, as in one of the cases, till the adult period.

In infancy, the tumor, when solid and of large size, can scarcely be mistaken for any other disease of the part, and at all periods, the congenital nature of the affection would serve to indicate its true nature. It would distinguish it from soft cancer and tubercular disease, the lesions most likely to occur to the testicle in early life. The excision of the tumor, including the testicle, is generally necessary. Velpeau managed in his case, by a very minute and laborious dissection, to save the organ; but the gland is, in most instances, so intimately connected with the tumor, and injured in structure, that the attempt to separate them can rarely succeed, or be desirable. In one instance, in an infant, the surgeon contented himself with incising the tumor, and extracting the foetal fragments.

CHAPTER XV.

ENTOZOA IN THE TESTICLE AND SCROTUM.

THE Entozoa very rarely indeed infest the testicle; in the examination of a large number of testicles I have not met with a monstrosity, in which the small and imperfect germs of an individual are grafted on, or constitute a parasitic growth in the body of another of larger size, and for the most part well formed. (Vide Geoffroy Saint-Hilaire, *Hist. des Anomalies de l'Organisation*.)

single example. Sir A. Cooper mentions an instance of an independent cyst, probably an *acephalocyst*, which was found accidentally on dissection in a sac connected with the epididymis. Dr. Baillie notices having seen a testicle with a small firm cyst adhering to it, which contained a *filaria medinensis* or Guinea worm.¹ In the Hunterian Museum at Glasgow, there is a preparation (No. 66 S) of a cyst attached to the lower part of the vas deferens containing this worm, which is very likely the specimen alluded to by Dr. Baillie. The man had probably visited some warm country in which the Guinea worm is found, and the animal having been developed in the lower part of the scrotum had caused the formation around it of an accidental cyst, which had contracted an adhesion to the vas deferens. In the Museum of the College of Surgeons in Edinburgh, there is a tumor (No. 2554) taken from the scrotum of a Lascar, containing a Guinea worm which had died and become converted into a substance resembling adipocere.

CHAPTER XVI.

SPERMATOCELE.

THIS term implies a tumor formed by a collection of the seminal fluid; but it has occasionally been applied by writers to swellings produced by varicocele and other affections of these parts. It is possible that the semen might collect in and dilate one or more of the seminiferous ducts in the body of the testicle, in consequence of some obstruction, and thereby constitute a swelling of a similar character to the lacteal tumor of the breast; but amongst the many hundred testicles I have examined, I have not met with a single instance of the kind. I have sometimes noticed, however, in testicles, otherwise healthy, small collections of thick caseous matter of a yellow color (apparently inspissated sperm) blocking up and distending some of the efferent tubes of the epididymis, and the round dilatations frequently connected with them. Similar collections have been noticed by Mr. Gosselin, who ascertained that they were caused by obliterations of the excretory duct (vide p. 205). The

¹ Morbid Anatomy, p. 237.

rarity of any considerable accumulation, causing a tumor obvious during life, to which the term *spermatocele* might be applied, may be readily explained by the readiness with which the spermatic fluid becomes absorbed into the system. In the following instance, the dilatations consequent on the retained sperm were more remarkable than usual.—A man, aged forty-four, died in the London Hospital of phthisis. One testicle was quite sound. The body of the other was soft, pale, and somewhat enlarged. The epididymis was remarkably enlarged, and formed a saccular tumor. The sacculi evidently contained fluid, and had a pearly lustre. The lower part of the vas deferens also exhibited frequent saccular dilatations, the coats of the duct at these points being thin and translucent. About the upper dilatation, and about an inch and a half from the tail of the epididymis, the vas deferens was obliterated by a firm deposit, partly fibrous and partly earthy. The mucous membrane of the duct below this was rough, and studded with earthy particles which grated against the knife. The fluid in the head of the epididymis was opalescent, in the tail white and thick, and in the vas deferens thin and gritty. There was no fluid in the duct above the point of obliteration. The fluid from the epididymis contained cells filled with spermatic filaments and free filaments in great abundance, and also a few altered cells, and others filled with fat granules. The fluid from the vas deferens contained altered epithelial cells, some with fat granules, others with earthy granules; and also the *debris* of spermatozoa. The fluid contained, too, free earthy granules, and some peculiar delicate spear-shaped crystals. The obliteration was no doubt of old standing, and the result of inflammation, but I could obtain no history of the case.

I have stated, that a swelling consequent upon an obstruction in the vas deferens has rarely been noticed during life. I am indebted to Mr. Crompton, of Birmingham, for the particulars of the following interesting case.—A gentleman's servant came under his care for what appeared to be a neuralgia of the right testicle, and he was for some time treated for such complaint without effect. He was frequently quite free from pain, and otherwise healthy. He was a married man, but was unable to have connection with his wife from the excessive pain he suffered before and at the time. It was so severe as to render him wet with perspiration, and nearly make him faint. He was able, however, to do his work as butler

during the day. On examining him, Mr. Crompton found, distinct from the testicle and about the point where the vas deferens commences, a small tumor, which was the seat of the severe pain. He could sensibly feel this tumor enlarging, until it became as large as a horse-bean, the pain increasing every moment. This was noticed on several occasions. If he suddenly examined the part, no tumor was to be found; but upon handling the scrotum the swelling commenced, and increased until the pain became excessive. When no tumor was to be felt the man was easy. It was ascertained that, at the age of eighteen, he had an attack of gonorrhœa, and orchitis on the right side; and a firm nodule still existed in the globus minor of the epididymis. Mr. Crompton supposes this case to have been one of stricture at the commencement of the vas deferens, in which opinion I am disposed to concur, though the gradual formation of the tumor during an examination of the part is not very easy of explanation. He gave the bichloride of mercury and applied belladonna to the part, but the patient got no relief, and his wife eloped with another man.

CHAPTER XVII.

NERVOUS AFFECTIONS OF THE TESTICLE.

WE may distinguish two kinds of nervous affections of the testicle. One, the more common of the two, consists in an exaltation of the natural sensibility of the part; and it is to this complaint that the term "*irritable testis*" used by writers more properly applies. The other is a true neuralgic affection of the spermatic nerves.

SECTION I.

IRRITABLE TESTICLE.

A patient suffering from an irritable testicle cannot bear the least pressure on the gland, in many cases not even the contact of his dress; he shrinks when the part is handled in the most gentle manner; and the motions of the testicle often occasion so much

uneasiness that he is prevented from taking exercise, and is compelled to remain constantly at rest in the recumbent position. The morbid sensibility is not always confined to the testicle, but sometimes extends up the cord to the loins, so that the passage of *fæces* through the colon and its distension by flatus are liable to cause uneasiness. The pain is in some degree increased when the patient is in the erect position and the testicle without support. It is frequently referred to one particular spot on the gland, which possesses more exquisite sensibility than the surrounding parts. In some instances both testicles are affected, one perhaps more than the other; in other cases the morbid sensibility is confined to one side, generally the left. There is no perceptible alteration in the parts, except occasionally a degree of fulness, more particularly in the spermatic cord; slight varicose dilatation of the veins, and a relaxed state of the scrotum. The complaint is usually tedious, and lasts many months. The persons subject to it are those of a weak and irritable habit, who are dyspeptic or hypochondriacal, and unequal to much bodily exertion. In severe cases of this affection all enjoyment of life and its pleasures disappears; the sufferers concentrate their thoughts upon their maladies; they fancy they shall never get cured; and whilst some become uneasy as to the effect of the complaint in impairing the integrity of the gland, and rendering them impotent, others as urgently desire castration as the sole means of relief from their distress.

Morbid sensibility of the testicles is in general intimately connected with the state of the genital functions, and is frequently dependent on abuses of them. In several instances I have known it to be consequent on onanism, and on involuntary seminal emissions; and I have found it disappear when the seminal discharges ceased. It may arise from morbid irritation at the prostatic part of the urethra. In one of the most obstinate cases I have had to treat, the complaint was evidently dependent on irritation at this part of the urethra, consequent on an abscess in the prostate which formed during an attack of gonorrhœa, and burst into the canal. It sometimes occurs after cessation from free indulgence in sexual intercourse; and it occasionally affects persons exposed to sexual excitement, but who have not been able to indulge their passions. In such cases the glands are very much in the same condition as the tender and swollen *mammæ* at the commencement of

lactation or of weaning. In several persons of chaste habits thus affected, the morbid sensibility disappeared on marriage. The testicles, like the mammae, often also become affected with morbid sensibility about the period of puberty. It sometimes succeeds an attack of consecutive orchitis, owing probably to a temporary closure of the excretory duct from inflammatory exudation, causing an engorgement of the seminal tubes, especially after excitement. In cases in which an attack of orchitis has ended in atrophy, the epididymis or remnants of the gland occasionally remain exquisitely sensitive. Though troublesome, this complaint generally disappears either spontaneously or under treatment after a longer or shorter duration.

Treatment.—In the treatment of morbid sensibility of the testicle the first object is to endeavor, if possible, to get rid of the cause of the affection. In many cases, however, this cannot be ascertained, or is only suspected. Attention must be paid to the state of the general health and of the digestive organs. Steel medicines and quinine may often be given with benefit. In many cases much service is derived from change of air and scene, so as to amuse the mind, and prevent the sufferer from brooding over his complaints. It often happens that when the mind is occupied, and the patient obliged to exert himself, he is free from suffering. As in many other nervous affections, the complaint becomes worse and aggravated by too much attention being paid to it. Advantage is often derived from cold bathing, and sponging the scrotum with iced water. I have sometimes succeeded in procuring relief with the douche bath, by causing a stream of cold fresh-drawn spring water to be directed on the scrotum so as to produce a powerful effect. The application should be made at least once daily. Enclosing the scrotum in a belladonna plaster, and supporting the parts, also sometimes afford relief. The testicle may at the same time be protected from the effects of friction and contact of the dress, when the patient moves about, by lining a full-sized suspender with a layer of soft wadding or wool. But the surgeon's success in the treatment of these cases mainly depends on his being able to ascertain the true cause of the complaint.—A young man, aged twenty-two, a sack-maker, applied to me for relief on account of distressing pains in the testicles. He stated that he was a single man, and had suffered from these pains for about two months. He was of a

weak frame of body, thin and pale, and had a languid, melancholy countenance, and was subject to headache. His voice was feeble, and he trembled as he entered the room. The penis and testicles were small in size; the latter were extremely tender when handled, so that he could scarcely suffer me to touch them. I directed them to be supported and kept cool, and as much as possible protected from friction, and ordered the shower bath and steel medicines. Suspecting, from his general appearance and the character of his countenance, that he was addicted to onanism, I twice questioned him upon the subject, but without eliciting that he was habituated to this vice. But after he had attended for some time, and the above remedies, as well as arsenic, quinine, &c., had been tried without any decided improvement, I made further inquiries, and ascertained that he had been for years subject to involuntary seminal emissions, which occurred without erections both in the daytime and at night, and often on evacuating the bowels. I introduced into the urethra a full-sized bougie, and found that it produced great pain on reaching the prostatic part of the canal. I then applied the nitrate of silver to this part. The application was transient, but the patient instantly fainted from the sharp pain which it produced. The effects of the lunar caustic subsided in about a week. No emissions occurred afterwards. The pains in the loins and morbid sensibility of the testicle soon completely subsided; he lost his headache, and in a few weeks became much improved in health, when he was discharged cured. In other cases in which the morbid sensibility was connected with seminal emissions, or dependent on irritation at the prostatic portion of the urethra, I have applied the solid nitrate of silver to the part with a beneficial result. In the chapter on Varicocele I have related a case of extreme morbid sensibility of the left testicle, arising from dilatation of the veins of the spermatic cord, which was cured by the application of a truss to the outer abdominal ring.

Castration should never be performed for this affection; for the complaint generally ceases sooner or later, and can almost always be relieved by judicious treatment. Romberg relates,¹ that he had a patient under his care who was attacked with this disease at the time he was engaged to be married. In spite of all the serious objections of a distinguished surgeon whom he had called into consul-

¹ *Lehob der Nervenkrankheiten*, S. 142.

tation, in spite of his own earnest representation, the patient insisted upon having castration performed; and the operation was accordingly done, that no greater mischief might ensue. Eight days afterwards the old pain had taken up its seat in the other testicle; but this its owner preferred keeping, the marriage being at hand, and he very soon recovered completely. The testicle which had been removed, with the exception of a few dilated vessels, did not differ in the slightest degree from the normal state.

SECTION II.

NEURALGIA OF THE TESTICLE.

In the nervous affection just described there is merely morbid sensibility; pain seldom being experienced whilst the patient remains at rest, and the gland and spermatic cord are supported, and entirely free from pressure or rough contact with the dress. The nerves of the testicle are liable, however, to a more painful affection, possessing the characters of *tie douloureux* or true neuralgia, in which the pain is sudden, severe, and remittent, and occurs in paroxysms of variable duration, generally at irregular, but occasionally at regular intervals. The pain is sometimes of an acute darting or lancinating description, at other times of a dragging or pricking nature; and is commonly attended with forcible retraction of the testicle to the groin by spasmodic action of the cremaster muscle, and occasionally with nausea and vomiting. Dr. Graves mentions a case in which the patient, when attacked with a paroxysm, would throw himself on the floor and roll about in the greatest agony, covered with a cold perspiration.¹ During the intervals of the paroxysms the testicle may sometimes be freely handled without causing pain; but frequently the neuralgia is combined with morbid sensibility, and a paroxysm is readily induced by the slightest pressure. In two cases, in which the neuralgic symptoms were slight, and appeared to depend on some affection of the kidney, the patient complained of a remitting pain or soreness at the crest of the ilium, near the anterior superior spinous process, though there was no tenderness on pressure.

In most cases of neuralgic testicle, there is no disease or alteration in the gland; but when the pains have been long-continued and

¹ Dublin Journal of Medical Science, vol. xiv, p. 371.

intense, the testicle occasionally becomes swollen and tender, and affected even with a slight degree of inflammation.

This painful affection is unaccompanied with fever; but the digestive organs are usually out of order, and the health deranged from the acute suffering and disturbance of the patient's rest. The neuralgia is almost always confined to the spermatic nerves of one side, whilst in morbid sensibility both sides are as frequently implicated.

Neuralgia of the testicle occurs at all ages, and arises from various causes. We have examples of it in the uneasiness in the organ and spasm of the cremaster muscle occurring in diseases of the kidney, and in the severe neuralgic pains usually experienced during the passage of a calculus along the ureter to the bladder. In treating of varicocele, I have stated that a dilated state of the spermatic veins is occasionally accompanied with neuralgic pains in the testicle; and as the latter occur subsequently to the appearance of the former, and subside on its removal, and often when the patient is in the recumbent position, we may conclude that the morbid condition of the veins gives rise to the neuralgia. But the cause is seldom so obvious as in these instances. The testicle has been accurately examined, and the nerves of the cord have been carefully dissected out, but very rarely has anything which could account for this distressing complaint been discovered.¹ Its primary seat has been referred to the spinal cord; in some instances it has appeared to depend on derangement of the digestive organs,² and in others it was evidently connected with a disposition to gout. In several cases, also, it has succeeded an attack of orchitis, continuing to distress the patient after all inflammation has subsided. In these cases it may be dependent on an obstruction in the vas deferens, as in the case related at p. 298; but in the majority of instances it is very difficult, and even impossible, to make out the cause of the neuralgic pains.

Treatment.—In cases of neuralgic testicle dependent on renal disease, the passage of a calculus along the ureter, or varicocele, the treatment must chiefly be directed to the relief of the complaints to which the nervous affection owes its origin. When the

¹ A perfectly healthy testicle, extirpated by Sir W. Blizard on account of this disease, is preserved in the Museum of the College of Surgeons.

² Vide an interesting case related by Sir B. Brodie, London Medical Gazette, vol. xiii, p. 620.

disease is connected with derangement of the digestive organs, or a tendency to gout, measures must be taken for their correction. In all cases, particular attention should be paid to the condition of the urine. Cases of neuralgic testicle, in which neither the cause nor seat of disease can be discovered, must necessarily be treated empirically. Those of an intermittent character are sometimes benefited by quinine in large doses, as five grains three times a day, or the *liquor arsenicalis*. In Dr. Graves' acute case of neuralgia previously alluded to, the complaint yielded to large doses of the sesquioxide of iron freshly prepared, and frequent inunction of the testicle and cord with belladonna ointment. The oil of turpentine sometimes proves very efficacious in these cases, when not dependent on renal disease. Other remedies of reputed efficacy in neuralgia have been tried in this affection, but have all disappointed expectations much oftener than they have cured. The various preparations of opium, hyoseyamus, and conium, often afford temporary relief; and they greatly contribute to mitigate the patient's sufferings, though incapable of removing the disease. The scrotum may be blistered, and the surface dressed with an ointment containing the acetate or muriate of morphia, in the proportion of five grains to the ounce. An ointment containing one grain of aconitina to a drachm of lard, smeared over the scrotum in the direction of the cord twice a day, will sometimes arrest the pains for many hours. The tincture of aconite, applied to the scrotum with a piece of sponge, produces a numbing sensation, and is efficacious in relieving both the morbid sensibility of the testicle and neuralgic pains. A piece of lint soaked in chloroform, applied to the part and covered with oiled silk, will have the same effect: or a liniment composed of equal parts of chloroform and olive oil may be rubbed in the course of the spermatic cord.

In cases in which remedies of every kind and in all shapes have been repeatedly tried, and have as frequently failed in affording more than temporary relief, the patient's life is sometimes rendered so truly miserable that he becomes anxious to undergo some operation, and even that of castration, to get rid of a disease of so obstinate and harassing a character. Operations, however, for the cure of neuralgia are in general very precarious and unsatisfactory, and as our experience increases, the less encouragement we find to repeat them. When the disease has a constitutional origin,

or its true seat is at a distance from the part where its painful effects are manifested, and beyond the reach of the knife, it would be unreasonable to expect any beneficial result from the division of the nerves, or the removal of the part to which the pains are referred; and we find, that in several of the cases in which the operation has been resorted to, no benefit has resulted from it.

Dr. Macculloch mentions a case of neuralgic testicle, in which, after a long period of suffering, the gland was extirpated in the usual manner, but the disease returned in the cord.¹ Mr. Russell has given a brief account of three cases of this affection which occurred in Edinburgh. In one, in the person of a medical practitioner, castration was performed on account of the intolerable suffering and with perfect relief. The patient recovered his health, strength, and spirits, which had been impaired by the severity and continuance of his complaints. A practitioner, encouraged by the success of this operation, adopted a similar practice in a like case, which, however, was not followed by an equally favorable result; as the patient experienced in the first instance but imperfect relief while the complaint gradually returned, increasing in severity, till at last it attained its original violence. The next case that occurred was treated upon other principles. The practitioner advised the patient to submit to his sufferings with patience, in the hope that time would at last accomplish a cure. The patient followed this advice, and was relieved from his misery in the course of eighteen months.² Sir A. Cooper resorted to castration in three cases of neuralgic testicle, in all of which the result proved satisfactory, the patients having recovered, and afterwards continued free from any return of the distressing complaint.³ If the details of these three interesting cases are carefully examined, the success of the operation can, I think, be accounted for. In all of them, it is clear, that the neuralgia had a local origin. In the second case, it was dependent on varicocele, and consequently admitted of perfect relief by castration, the cause of the disease being removed together with the testicle, though the morbid condition of the veins might have been remedied by milder treatment. In the two other cases, it appears that the neuralgia was originally induced by an

¹ Essay on the Marsh Fever and Neuralgia, p. 77.

² Observations on Diseases of the Testicle, p. 186 et seq.

³ *Lib. cit.* p. 69 et seq.

attack of orchitis; and though it afterwards proved irremediable by antiphlogistic means, and persisted after all inflammation had subsided, the nerves affected were evidently those immediately connected with the testicle, which, having been removed, the painful symptoms all ceased. In cases, then, in which the neuralgia has a local origin, is confined to one side, and is clearly dependent on some change in the state of the nerves of the testicle or cord, castration might be performed when the symptoms are sufficiently severe, and the patient is willing to undergo it, with a fair prospect of permanent relief.¹ But in cases in which it is impossible to determine exactly the seat or the cause of the disease, the surgeon incurs no slight risk of failure; and if he ventures to undertake the removal of so important an organ as the testicle at the earnest entreaty of the sufferer, it would be his duty, as well as his policy, fully to apprise his patient of the uncertainty of the result.

CHAPTER XVIII.

SYMPATHETIC AND FUNCTIONAL DISORDERS OF THE TESTICLE.

DEFECTIVE as is our knowledge of the sympathetic and functional disorders of the glands, there are few with whose derangements we are less perfectly acquainted than the testicles. The functions of these organs are so involved in the actions of other parts, are influenced by such peculiar causes, and are so dependent on and modified by particular events and circumstances, that the investigation of their disorders is necessarily complex and difficult. During life, the product of these glands is never afforded in a pure and unmixed state, so that it is almost impossible, either by chemistry or the microscope, to appreciate properly the qualities of

¹ Mr. Harvey Ludlow relates in his Prize Essay the case of a man aged twenty, a patient in St. Bartholomew's Hospital, who had suffered for six years from neuralgia of the left testicle, which originated in an injury of the part followed by inflammation. After the trial of various remedies without success, Mr. Stanley, with the concurrence of his colleagues, removed the organ. On examination, the surfaces of the tunica vaginalis were found partially adherent, the membrane being thickened; and the epididymis was changed into a firm white fibrous substance. There had been no return of pain three months after the operation.

the secretion, and to note the changes dependent on disease. And as a repugnance is generally felt to such inquiries, it is not surprising that the functional disturbances of the testicle have been but imperfectly investigated, and rarely treated of by the pathologist and legitimate practitioner.

The functions of the testicles, like those of other secreting organs, may become suspended and incapable of excitement; or they may be exerted to excess, improperly excited, and so abused, as to fail prematurely, or produce injurious effects on the constitution.

SECTION I.

DEFECTS IN THE FUNCTIONS OF THE TESTICLES.

The testicles not being parts essential to life are subject to different laws from those which regulate the actions of the vital organs. Their functions may be suspended, or they may remain in abeyance for an indefinite period without injury to the glands, or any material effect on the constitution. In persons of recluse and studious habits these organs often continue dormant for years. Like the mammæ in the unmarried female, though inactive, they remain sound and competent for secretion when duly excited and called upon to exercise their functions. The opinion, that in manhood the testicles waste from long-continued chastity, I believe to be as erroneous as its tendency is obviously injurious and immoral, in furnishing an excuse for illicit intercourse to those who cannot otherwise indulge the sexual appetite. The case is somewhat different, however, late in life. Thus widowers, after remaining chaste for some time, on marrying have been doomed to disappointment. Inaction has hastened the natural decline.

The impulse for commerce with the other sex exists in different degrees of force in different men, those of a sanguine temperament being most prone to indulge, and best able to do so without hurt. In the adult the moderate exercise of this function is favorable to health, and to the maintenance of the powers both of the mind and body. A certain degree of vigor, however, is necessary to bear the nervous excitement attending it; hence in advanced years, and in weak and susceptible individuals, the frame is unable to sustain frequent coition with impunity. The old man often pays dearly for a matrimonial connection with a young woman by an

attack of paralysis, or else an exhausted frame, premature debility, and death. Rules have been given for regulating the sexual functions and restricting the performance of them within due bounds. They are, however, of little value, for, as I have already mentioned, the powers vary greatly in different persons, and at different periods of life; and what is moderation in one man, or at one period of life, is excess in another man, or at another time of life. Whenever the sexual act is followed by a prolonged sense of debility and lassitude, an uncomfortable feeling in the head, and disinclination for either physical or mental exertion, the limits consistent with health have been exceeded. The hurtful effects of frequent sexual intercourse result less from the drain upon the system by the discharge of the seminal secretion than from the nervous excitement attending the act. In cases, also, of excessive masturbation, the amount of fluid evacuated bears no proportion to the exhaustion of the bodily powers, and the prostration of the mental faculties consequent on the practice. Not only is the enjoyment heightened, but the effects of coition on the constitution are far less depressing when the necessary energy is supplied by the stimulus of a warm attachment, than when the appetite is irregularly indulged in fornication. The nervous system is invigorated by the passion, and acquires a power which enables it to bear the excitement of repeated coition; whilst the debauchee often suffers as severely in his health as he always does in his morals, from the unrestrained gratification of his animal propensities.

The testicles are under the influence of the brain, which animates and controls the desire for sexual enjoyment. An emotion of the mind, as sudden disgust or anger, arrests the secretion of these glands, and quenches sexual ardor as quickly and as effectually as a strong mental impression stops the secretion of gastric juice and takes away the appetite for food. An attack of apoplexy often permanently extinguishes all desire as well as capacity for coition. In Chapter II, I have mentioned cases in which the procreative function has been annihilated and complete wasting of the testicles has resulted from injuries of the head, as well as cases of idiots whose genital organs were imperfectly formed, and who had experienced no inclination for sexual pleasures. I will now adduce some additional facts in relation to the influence of the brain on the functions of the testicles.—Hildanus mentions the case of a man

accused of impotency by his wife, who sued for a divorce. Nothing external was defective; but the man stated that eight years previously he had received a blow on his head by a stick. From that period "*confitebatur penem erigi non posse.*"—Mr. B., aged forty-one, a passenger on the railway between Boston and Providence, apprehending an accident, thrust his head out of the window at the moment that the train came in collision with another running in an opposite direction with fearful violence. Most of the passengers were thrown out, and seriously injured. Mr. B.'s head and neck struck against the edge of the window-frame with great force; and he himself was thrown to the ground, where he remained for some time in a state of insensibility. He, however, regained his senses, and was conveyed home in a carriage. The surgeon, on visiting him, found him suffering with great pain in the occipital region and upper part of the neck; but there was no indication of fracture of the skull or spine. On the second day after the accident he complained of a numbness in his right arm, and experienced difficulty in passing his urine. In the course of two weeks he was able to leave his bed, and walk in the street; but his vision was defective. Between the fourth and fifth week after his injury he made the discovery that he had lost the desire and physical power for sexual intercourse, and that no amorous sentiment, or the approach of a female, could excite it. Under appropriate treatment the bladder gradually recovered its power, and his vision became perfect; but the numbness of the right arm continued, and the generative functions remained impaired. His mental powers, particularly his memory of events, were also for a time seriously affected.² Dr. Smyth, in some excellent observations on the subject of impotency, states that he has seen complete impotence (absence of erection) of three months' duration, accompanied by general emaciation and impairment of health, excessive irritability of both mind and body, and considerable shrinking of the penis and testicles, occur in a strong young man of twenty-five from injury of the back part of the head. This gentleman being engaged in a quarrel, received a blow on the face which stunned him; and having fallen backwards, first struck the ground with the tuberosity of the

¹ Opera Observationum et Curationum Medico-Chirurgicarum, p. 574.

² Case related by Dr. Fisher. American Journal of the Medical Sciences, Feb. 1839, p. 357.

occipital bone, and sustained in consequence a concussion of the brain, manifested by insensibility and total unconsciousness of eight or ten hours. Being a diligent student of medicine, he continued his professional pursuits the following day, and without interruption for six weeks, during which time he took no further notice of the occurrence. The general emaciation and failure of the sexual function were first perceived in a little more than a week after the injury.¹ Dr. Gall mentions that at Vienna he was consulted by two officers who had become impotent in consequence of blows from fire-arms which had grazed the napes of their necks.²

When impotency depends on an injury of the head, the prospect of relief is in general far from promising. The event itself is one of the last to be detected, and is rarely perceived till all treatment of the injury has ceased, and the patient is in progress of recovery. In some instances it is first announced by the visible wasting of the testicles. When otherwise, however, the surgeon must not despair of the patient's regaining his sexual powers as the other effects of the injury disappear. Thus one of the officers mentioned by Gall recovered by degrees the generative faculty, married, and became the father of several children. Purgation, followed by a slight alterative course of blue pill, effected a complete and speedy cure in Dr. Smyth's patient, after change of air and other hygienic measures had been tried in vain: as the gums became tender the patient began to recover flesh, and to experience a return of the procreative power. In the case of the patient injured on the railroad, the function was only partially restored. The treatment required in these cases is such as would be adapted to remove the other symptoms of cerebral mischief. If aphrodisiac medicines are used, they must be given with great caution. Electro-galvanism, applied from the occiput along the spine, might prove of service.

The reader will recollect the singular case of arrest of the development of the testicle related at p. 89, in which the organs acquired their normal size and assumed their functions at an unusually late period of life, as the dormant passions were aroused by a particular attachment. No doubt some men, especially those who constantly exert their mental powers in some engrossing pursuit, are less susceptible to the influence of the female sex than usual; and in such

¹ The Lancet, August 28, 1841, p. 784.

² On the Functions of the Cerebellum, tr. by Combe, p. 46.

persons, until a suitable impression is made, and the instinct is excited, the sexual organs may remain long inactive, and in abeyance. There are well-recorded instances of men, and of persons too of great intellectual attainments, who, though to all appearance robust and perfectly formed, have not only passed a life of absolute chastity, but have never even evinced the slightest disposition for sexual enjoyment. In the figurative language of Sir A. Cooper, "To such persons a Venus might display her charms, and on such her son might exhaust his quiver, in vain. No genial spring is here, no blooming summer, or fruitful autumn; but all is winter—a dreary, desolate, and barren winter—in which the springs of life are frozen up, and the animal propensities destroyed." It is difficult to account for such cold indifference; but we may suppose that, in some instances, that particular part of the brain which is the seat of the procreative function has been but little or imperfectly developed. The several facts stated in this work fully justify the inference that the functions of the testicles may remain unexercised, and that impotence may ensue from a cerebral defect, or from the absence of the usual stimulus derived from the sensorium; and though more often occurring in idiots, I perceive no reason why such a fault should not exist in a brain otherwise in a high state of perfection. This constitutional and congenital form of impotency is sometimes, but not always, accompanied with arrest in the development of the sexual organs, and an effeminate appearance and frame of body.

Impotency of a temporary nature may be the effect of violent emotions of the mind, as mental affliction, anxiety, and rage; indeed any impulse sufficiently intense to absorb the attention to the exclusion of the sexual passion will extinguish desire, and arrest the secretion of the testicles. Thus sudden and exciting news, either good or bad, has been known to allay the sexual passion. When, however, the emotion subsides, and the mind becomes tranquillized, the generative instinct is again aroused. Disgust, also, is sometimes a cause of sexual incapacity. Thus men, at other times competent to the act, have remained impotent in the company of certain women, owing to a particular aversion to the uninviting person, or the coldness and indifference of their companion. For such cases of relative impotency the remedy is obvious.

Not an unfrequent cause of a failure in the exercise of the reproductive powers is want of self-confidence,—excessive apprehension

of inability to perform well the duty of the sex. When persons are so timid and diffident as to entertain these groundless fears, it may be long before success attends their efforts, every failure adding to the evil by diminishing the reliance upon their powers. Mr. Hunter has treated this kind of impotency depending on the mind with his usual sagacity, and has related the following case.—He was consulted by a gentleman who had lost his powers in this way. The patient was subject to erections, accompanied with desire; but from doubt, or fear, or the want of success, was unable to copulate with a particular female. Mr. Hunter told him that he might be cured if he could perfectly rely on his own power of self-denial. He was then recommended to go to bed to this woman; but first to promise himself that he would not have any connection with her for six nights, let his inclinations and powers be what they would, which he engaged to do. This resolution produced such a total alteration in the state of his mind, that the power soon took place; for instead of going to bed with the fear of inability, he went with fears that he should be possessed with too much desire, too much power, so as to become uneasy to him, which really happened; for he would have been happy to have shortened the time: and when he had once broken the spell, the mind and powers went on together, his mind never returning to its former state.¹ Modes of varying this advice in the case of persons recently married, who may be affected with this form of impotency, will readily occur to the practitioner. Thus, some mild tonic may be prescribed, and the patient be directed to abstain from intercourse while under treatment, and the surgeon may rest satisfied that not many days will pass over before nature asserts her empire. These cases must, on no account, be lightly treated. The situation of the patient is often one of great distress of mind, and much relief may be afforded by the surgeon calmly reasoning with him on the subject of his complaint. He may be told that his case is not uncommon; the true cause of failure may be pointed out; and he may be confidently assured of the groundless character of his fears, and of the influence of his doubts and apprehensions in preventing him from fulfilling his desires. Kind and confidential advice of this nature, by encouraging the patient, will do more in effecting a cure than any sort of medical treatment or stimulating medicines. A single

¹ Treatise on the Venereal Disease, 4to, p. 203.

success at once banishes all his fears, and gives security for the future.

It has been confidently asserted that excessive indulgence in tobacco-smoking weakens or destroys the sexual powers. I know of no facts to warrant the belief that tobacco exerts a special sedative effect on the genital organs, or that such injurious influence results from the habitual practice of smoking it in moderation. The Germans, whom we should regard as excessive smokers, evince no failure in the reproductive functions; and although the importation of tobacco into this country has largely increased in recent years, the Registrar General's Reports exhibit no corresponding decrease in the population. The intemperate use of tobacco, however, especially by chewing, is very liable to impair the digestive organs, and lower the nervous force, and I have no doubt whatever that its depressing influence is likewise manifested in a diminution of the sexual powers. In several cases of impotency with dyspepsia in persons between thirty and forty years of age, which have fallen under my notice, I have found on inquiry that they were either inveterate smokers or habitual chewers of tobacco,¹ and no treatment proved effectual without great restriction in these customs. Opium, whether chewed or smoked, is still more hurtful than tobacco. There is ample evidence of impotence being a common effect of indulgence in this pernicious drug.

Abuse of the sexual functions is a frequent cause of impotency, and of impotency very difficult to treat and remove; for moral as much as medical treatment is required, the mind being frequently more at fault than the body, and the surgeon finding it as necessary to urge the duty and importance of self-control as to prescribe for the patient's health. Such advice is particularly called for in persons whose inclinations are stronger than their powers of fulfilment. By indulging the mind in erotic thoughts, desires are created which lead to sexual excesses, imperfect performance, and ultimately to failure. Many men, usually persons in affluence or without occupation, allow their minds to be so constantly occupied with these functions, that they render themselves truly miserable,—become hypochondriacal, morose, and reserved, and unfitted for the social duties of life. They seem to consider that they are born for no other purpose than to gratify an animal passion, and it sometimes

¹ One of these patients was an American, a mate of a ship.

becomes the surgeon's duty to expose the folly and evils of such infatuation. Persons who indulge to excess sometimes become suddenly impotent, and a considerable period of rest may elapse before the organs are capable of resuming their functions. Such occurrences are not unfrequent shortly after marriage. Addiction to sexual pleasure in early life often entails a permanent loss of power in middle age, at a period when most men still retain it in full vigor. This is often experienced in the despotic countries of the East. M. Volney,¹ in his Travels through Asia Minor, mentions that the people of rank in that country, who can afford the expense of a harem, often complain of impotency at the early age of thirty. Mr. Russell, of Edinburgh, in some excellent observations on this subject, remarks, "that matters are not so bad in this country, though it is a well-known fact that young men of fashion, who indulge their amorous propensities at an early age, lose the power of procreating sooner than the more continent."² Too great indulgence of the sexual appetite is productive, however, of other effects besides premature impotency: as every practical surgeon is aware, it tends to derange the digestive functions, and to weaken the physical and mental powers. Sexual excesses are likewise a fertile source of the diseases of the testicle: persons affected with chronic inflammation and other disorders of the gland frequently, and I believe with justice, refer their complaints to an unrestricted indulgence of their passions. In men advanced in age, irritability of the bladder and chronic catarrh are not uncommon results of such excesses; and I presume that the frequent desire to micturate under these circumstances gave rise to the ancient proverb, *raro mingitur castus*. Sexual indulgence late in life seems also to promote the enlargement of the prostate gland; and I know of several instances of old men being attacked with retention of urine from congestion of this organ occurring after coition. I suspect, too, that these excesses, if long continued, are very apt to lay the foundation of disease in the kidneys. A gentleman, who when young had been much addicted to the society of women, invariably suffered subsequently from pains in the loins, and alkaline urine, after intercourse with the sex. There can be little doubt, too, that the erotic longings which sometimes continue to distress the aged long after the period

¹ Voyage en Syrie et en Egypte, tom. ii, p. 444.

² Observations on the Testicles, p. 35.

at which in the course of nature they should have ceased, depend as much on physical infirmity as mental depravity, a diseased state of the prostate inciting and producing the morbid desires. By regarding these propensities as symptoms of disease, and treating them accordingly, they would often subside, and the subjects of them would cease to indulge in vicious courses.

One of the most common results of inordinate excitement of the genital organs is an excessive involuntary discharge of the spermatic fluid, or *spermatorrhœa*, a subject which will be considered in Section II of this chapter.

Diseases and injuries of the spinal cord, producing paraplegia, have no direct effect on the testicles, but destroy the power to copulate. In the chapter on Atrophy I have given instances of wasting of the testicles succeeding an injury to the spine. In general, desire remains, the seat of the instinct being unaffected; and I suspect that in the cases alluded to, in which wasting took place, the injury affected other parts besides the spinal cord. M. Brachet has recorded the following curious case.—A soldier after several years' service experienced, in 1814 and 1815, rheumatic pains, particularly in the lumbar region. In 1816 he had a fall from his horse. By degrees, the lower extremities and inferior part of the abdomen became completely paralyzed. For eight years the paralysis remained stationary. Whilst in this state he had two children. The spermatic fluid was secreted, erection took place, and ejaculation followed; but “sans secousse et sans sensation voluptueuse.”¹ We must suppose that in this case, although the sensibility of the penis was destroyed, the connection between the brain and testicles was still maintained by the sympathetic system, which communicated the necessary influence; and that their functions were, accordingly, as little disturbed by the affection of the medulla spinalis as are those of the important organs of the abdomen in the same disease.² But, notwithstanding the

¹ *Recherches Experimentales sur le Système Nerveux*, 2d edit. p. 280.

² M. Brachet performed the following experiments.—Having made sure that a cat a year old had covered several times a female cat with which he was shut up during the day, M. B. divided his spinal marrow between the third and fourth lumbar vertebrae. All behind was paralyzed, the rectum and bladder equally so. He kept the animal three days; when, on examining the genital organs, he found them healthy, and the vesiculae seminales full of semen. This experiment was repeated three times with the same result. The next is given in the words of the experimenter: “Sur un chat de dix mois, je fis la section de la moëlle spinale dans la région lombaire.

success of this old soldier, there are few in a state of paraplegia who would not find themselves physically incapacitated. The *nuxvomica* is adapted not only to relieve the paralytic symptoms, but also to restore the sexual powers.

Varicocele tends gradually to impair the nutrition and diminish the secreting powers of the testicle.¹ Hence the importance of not neglecting this complaint, though it may produce no painful symptoms. The influence of detention of the testicles in the abdomen and in the groin external to the cavity, on the sexual functions, have been already considered in a previous chapter.

Diseases which destroy the substance or produce wasting of the testicle necessarily prevent its secreting. The functions, however, of this gland are not very readily impaired by disease; and so long as a small part remains entire, the organ may be fitted to perform its office sufficiently for the end destined by nature. When the testicle is to a great extent disorganized by the exudation of lymph, and forms an open fungoid sore, secretion may still go on under excitement, as is evinced by the presence of spermatozoa in the discharge. This fact shows the importance of the surgeon striving to save the testicle when mutilated either by accident or disease. In double hydrocele the functions of the testicles continue unaffected. After severe or repeated attacks of acute orchitis the glandular structure of the testicle almost invariably manifests a diminution in bulk, and more or less impairment of its secreting powers. In inflammatory affections of the epididymis, although the plastic matter effused amongst the convolutions of the duct is liable to obstruct the tube, the effect is rarely more than temporary, owing partly to the readiness with which such exuda-

Comme la paralysie du train derrière mettait cet animal dans l'impossibilité d'exécuter les manœuvres du coït, j'y fis suppléer par une sorte de masturbation. Il fallut plus de tems, mais elle finit par déterminer une éjaculation. Vingt-quatre heures après, je fis répéter la même manœuvre; et une nouvelle éjaculation eut lieu; je la fis encore répéter le lendemain avec le même résultat." (Lib. cit. pp. 289-291.) These experiments, though interesting, as showing that the functions of the testicles may be carried on in paraplegia without sensation or any influence derived from the brain through the spinal cord, do not, as Brachet supposed, prove that the secretion of sperm is altogether independent of the influence of the spinal system.

¹ M. Gosselin observed in a case of varicocele on the left side, in which the testicle was one-third smaller than the other, that after an attack of gonorrhœal orchitis in the right testicle, no spermatozoa could be detected in the semen. *Archives Générales*, 5e série, t. ii, p. 268.

tions are absorbed, but chiefly to the absence of a strong fibrous envelope, and the yielding nature of the serous membrane by which it is invested; for, as I have already stated, after inflammation of the body of the testicle, wasting and disorganization of its glandular tissue are not uncommon. Chronic orchitis, as I have previously remarked (p. 230), also proves more or less destructive to the organ. It is extremely difficult to obtain satisfactory evidence of the effects of disease on the functions of the testicle in cases in which there is no absolute diminution of its bulk, not only for the reasons stated at the commencement of this chapter, but also in consequence of the rarity of both glands being seriously affected, and the greater rarity of their both suffering in precisely the same degree. Vidal has adduced some cases which bear on the point.—In a robust man, aged twenty-nine, affected with syphilis, the left testicle swelled to a great size, and was removed by operation. Two years afterwards the right testicle became very large and hard, and the seat of sharp lancinating pains. Viewing the disease as syphilitic, M. Vidal prescribed the iodide of potassium, under which treatment the enlargement subsided, and the testicle recovered its normal state in three months. The man was afterwards much addicted to sexual pleasures, and contracted gonorrhœas.¹ A carman had one testicle, the right, undeveloped and detained outside the inguinal canal. The left was attacked with syphilitic disease, which subsided under treatment without impairment of sexual power.² M. Vidal, whilst admitting the injurious effects which generally result from syphilitic inflammation of the testicle, adduces these cases to show that the organ is not invariably damaged either in structure or function by the disease, a conclusion which my own experience enables me fully to confirm. He has also related a case in which, after an attack of double orchitis in a man aged fifty, one testicle became atrophied and the other hypertrophied. True hypertrophy of the testicle is so rarely observed under any circumstances, even in early life, that we may fairly hesitate to admit the enlargement to have been due to an excess of nutrition. It was most probably occasioned by unabsorbed inflammatory exudation. The injurious effects of chronic orchitis ending in a fungous growth, and perhaps of the treatment by excision, are shown in the follow-

¹ *Traité de Pathologie Externe*, t. v, p. 461.

² *Mémoires de la Société de Chirurgie de Paris*, t. iii.

ing case described by Mr. Lawrence.¹—In a man, aged twenty-three, the right testicle became hard and painful, and in four months the skin burst, and a growth projected which the surgeon gradually cut away, and the parts cicatrized. The cord could be traced to a small lump connected to the cicatrix. A month later, the left testicle became affected in a similar way, and a fungus arose, which was destroyed by lunar caustic, and a cicatrix ensued. Mr. Lawrence adds that the man had lost all venereal appetite since the left testicle began to swell.

Certain affections, as carcinoma, generally extend until the glandular structure is wholly destroyed. But, as I have just remarked, it is seldom that both testicles are disorganized; and the remaining one, if sound and well developed, is fully sufficient for the purpose of reproduction. The same holds good when one testicle has been removed by operation; but when both are extirpated or destroyed, the patient becomes absolutely and permanently impotent. The question has been raised, and was at one time much discussed in Germany, whether a person castrated after arriving at the age of puberty may not retain the power of procreating for a certain period afterwards. The following case bearing on the point is recorded by Sir A. Cooper.—A man had one of his testicles removed in 1799. In June, 1801, the other testicle was removed by Sir A. Cooper in Guy's Hospital on account of a chronic abscess. He had been married prior to the loss of one testicle. Four days after the second operation it was found that he had had during the night an emission, which appeared upon his linen. After he had recovered and quitted the hospital Sir A. Cooper repeatedly visited him for many years. For nearly the first twelve months he stated that he had emissions *in coitu*, or that he had the sensations of emission. That then he had erections and coitus at distant intervals, but without the sensations of emission. After two years he had erections very rarely and very imperfectly, and they generally immediately ceased under an attempt at coitus. Ten years after the operation he said he had during the past year been once connected. In 1829, he visited Sir A. Cooper, because he was a severe sufferer from piles. He then stated that for years he had seldom any erection, and then that it was imperfect; that he had no emissions from the first year of the operation; that he

¹ Edinb. Med. and Surg. Journal, vol. iv, p. 262.

had for many years only a few times attempted coitus, but unsuccessfully; that he had once or twice dreams of desire, and a sensation of emission, but without the slightest appearance of it. The penis was shrivelled and wasted. He shaved once a week, and sometimes twice. His voice, naturally rather feeble, remained as at the time of the operation. Mr. Wilson performed the operation of double castration on a married man for carcinomatous disease of the testicle. The wounds cicatrized in little more than a month, and he survived the operation two years. He assured Mr. Wilson that after the removal of the testicle he had occasional erections, not unaccompanied with desire, and which, when as a married man he indulged, were attended with the usual paroxysm and emission of some fluid.¹

In determining the question alluded to, we must not confound the power to copulate with that of impregnation. It has been seen that the loss of the testicle so affects the brain as completely to extinguish the sexual instinct; but this is an effect which is not immediate, but takes place gradually, as is clearly shown by Sir A. Cooper's case: hence we must admit that the castrated individual may experience desire, have erections, accomplish the coitus, and emit fluid for several weeks after recovery from the operation. But the fluid which is essential for the propagation of the species is the secretion of the testicles, none of which can of course be elaborated after the removal of both glands. The question then resolves itself into this,—how long may the seminal fluid already formed remain in the excretory ducts and vesiculæ seminales in a condition to impregnate the female? Much, of course, must depend on the state of the testicle or testicles at the period of the operation. If the gland last removed were thoroughly disorganized, taking into account the period previous to the operation since which the organ could have been in a condition to secrete, and the time occupied in the healing of the wound, which, together, cannot be estimated at less than eight or nine weeks, we may decide that in such a case the castrated patient would be unable to impregnate; since in the numerous examinations which I have made of the fluid taken from the vesiculæ seminales and vasa deferentia of hospital patients who have died of various chronic diseases, I have never found spermatozoa in them at a later period

¹ Lectures on the Urinary and Genital Organs, p. 133.

than seven weeks after their admission, or after they had possessed the opportunity of having sexual intercourse. In a case, however, in which the testicles were sound and capable of secretion at the time of castration, it must be concluded that a sufficiency of the spermatic filaments may remain in the excretory ducts and vesiculæ for two or three weeks after recovery from the operation in the usual period, so as to allow of the possibility of impregnation being effected, improbable as such an occurrence must undoubtedly be regarded.

Some error has prevailed respecting the effects of chronic constitutional diseases in impairing the functions of the testicles. Thus, consumptive individuals are supposed to be more than ordinarily addicted to sexual pleasure; and it has been stated that they have retained the power and propensity to gratify it up to the very day of death. Louis made careful inquiries in reference to this point, and found in every instance that the tendency to sexual intercourse declined with the increase of general weakness and other symptoms, almost exactly as is the case with individuals laboring under any other affection. The accuracy of this statement is confirmed by my own observations and inquiries. I examined the testicles of four persons who had died of pulmonary consumption, and found that they were all below the average weight and size of those of healthy adults. In the testicles taken from the bodies of twelve phthisical patients examined in the London Hospital, no spermatozoa could be detected in the fluid obtained from the substance of the gland and epididymis. In several of these cases, the contents of the vesiculæ seminales were likewise examined, and found destitute of spermatozoa.¹ Rayer has also remarked that the vesiculæ of phthisical patients afford few or none of these bodies.² The testicles of persons who die of chronic lingering diseases are almost invariably soft and inelastic. Their glandular structure seems to contain but few bloodvessels, is pale, apparently shrunk and dry, and the little fluid that can be squeezed from it is destitute of spermatic cells.

A fit of dyspepsia is an occasional cause of temporary loss of

¹ Dr. Davy examined microscopically the fluid taken from the divided substance of the testicle of twelve persons who died of phthisis, but in no instance discovered spermatozoa; but he found them in several instances either in the vesiculæ seminales or vasa deferentia. *Edinb. Medical and Surgical Journal*, July, 1838, p. 1.

² *Archives Générales de Médecine*, Août, 1842, p. 487.

virile power. A gentleman, after a separation of many weeks from his wife, on his return was much alarmed by finding himself incapacitated. On inquiry, it appeared that he had dined imprudently, and had suffered from indigestion and heartburn during the night. Virility is more permanently affected by organic disease of the abdominal viscera; but there are few complaints which have greater influence in impairing the generative functions than those of the kidneys. Diuretics, as the nitrate of potash, carbonate of soda, &c., are well known to act as anaphrodisiacs. In diabetes and albuminuria the reproductive organs are weak and often quite inactive.—A married gentleman, aged forty-eight, at the request of Mr. Gardner, of Bayswater, consulted me on account of loss of sexual power. I found on inquiry that he voided urine in large quantity. It was pale, feebly acid, and slightly albuminous, its specific gravity being 1.012. Under treatment adapted to correct the disordered actions of the kidneys, he entirely regained his virile powers. Several similar cases have come under my notice. In irritative dyspepsia, with deposits in the urine of the earthy phosphates or oxalate of lime, there is generally more or less inability. Impotency in these cases is only one of the manifestations of defective assimilation and depressed vital force; though it is often the symptom which chiefly attracts the attention of patients. They are observed to lose flesh, and to have a quick irritable pulse. They are weak and readily fatigued, feel unfit for either bodily or mental exertion, sleep badly, and are subject to excessive depression of spirits, and sometimes complain of a deep-seated dull aching sensation in the loins. Though in both these forms of urinary disorder the generative force is generally deficient, the defect is greater and more marked in dyspepsia, attended with deposits of the oxalate of lime, than of the phosphates, and the power is often altogether lost. The late Dr. Golding Bird, who first drew the attention of the profession to the oxalate of lime as a common deposit in the urine, ascribed the impotency attending it to the exhaustion produced by the excessive secretion of urea so common in this affection.¹ Dr. Begbie has described the symptoms of the irritative form of dyspepsia, in which the oxalate of lime abounds in the urine, with great accuracy; and in his valuable paper has related several well-observed cases of this affection. He noticed in the more confirmed

¹ Bird on Urinary Deposits, 3d edit. p. 231.

forms a complete prostration of the virile powers.¹ In some of the cases which have fallen under my notice, the patient has been affected slightly with spermatorrhœa, to which the sexual weakness was attributed, the chief cause having been quite overlooked. On making a microscopic examination of the cloudy urine I have sometimes excited surprise by the announcement that, instead of spermatozoa, it contained abundance of octahedral crystals—an indication of impaired digestion, not of seminal waste. It has been stated, that the presence of these crystals is a pretty sure indication of the existence of spermatorrhœa. They are found, it is true, very generally in the urine of persons laboring under this complaint, but I quite agree with Dr. G. Bird that this salt constantly occurs where no suspicion of an escape of semen can be entertained. In all instances of dyspepsia with impotency, the surgeon should make a careful examination of the patient's urine, and by doing so he will often be able to detect a cause for the weakness quite within the reach of remedies. The treatment of such cases by careful regulation of the diet, and the administration of the mineral acids and other remedies calculated to check the formation of the urinary deposits, and to improve the general health, is indeed very successful in restoring sexual vigor. The phosphatic deposits occurring in dyspepsia are in general more readily corrected by treatment than those of the oxalate of lime. Patients suffering from the latter often require careful and prolonged treatment before the mal-assimilation which leads to it is corrected. In cases in which the generative functions have been previously weakened, and the general health deranged by excessive indulgence in coition, masturbation, or long-continued involuntary emissions, the results are not always satisfactory. Dr. Golding Bird mentions the case of a gentleman who committed the gross folly of testing his powers previous to marriage, by sleeping with two women. The result was an epileptic fit; and from that moment he has been paying a heavy penalty for his indiscretion in the persistence of the symptoms of oxaluria in an aggravated form.²

Impotency sometimes occurs in middle life without any obvious cause. In such persons I have noticed a constitutional change, similar to that which takes place in eunuchs. They have been observed to grow sleek and corpulent, to have a scanty beard, and to

¹ Edinb. Monthly Journal, Aug. 1849.

² Lib. cit. p. 234.

be indisposed to active muscular exertion. In general, they evince no unhappiness at their altered condition. This state is far from hopeful, but the following case affords encouragement.—In 1853, I saw, with Mr. Arthur, of Shadwell, a publican, aged forty-one, of a full florid complexion, married, and the father of a family. He complained of defective sexual power, and stated he had been strong in this respect, and had experienced no failure until about twelve months previously, during which period he had grown remarkably stout. He experienced scarcely any inclination for sexual intercourse, and had lost almost entirely the ability to indulge in it. He had been slightly affected with gout a few weeks before, but he was quite free from it and in good health at the time of his consulting me. His chief annoyance arose from his wife suspecting him of infidelities in consequence of his neglect of marital duties. His testicles were of proper size, but somewhat soft and flaccid. I formed rather an unfavorable prognosis in this case, but recommended his taking the ergot of rye with quinine, plenty of exercise, and paying careful attention to his health. He took the medicine for a fortnight, and then left town for change of air. After his return, in about three months, he called on Mr. Arthur, who found that he had lost weight considerably, was more capable of taking exercise, and that he had no occasion to complain of inability.

In the preceding observations, whilst explaining the various causes impairing the functions of the testicles, I have, for the most part, indicated the nature of the treatment required for their restoration. Certain medicines reputed to possess the property of stimulating and invigorating the sexual organs have been classed as *aphrodisiacs*; and some of them are said to be used, especially in the East, by the sensualist, to excite the organs when exhausted by satiety and excess. Several of these remedies act on and stimulate the urinary apparatus, and thereby give a temporary power to the function of erection; but they produce little or no effect on the special sexual organs. They act much in the same way as hæmorrhoids, affections of the prostate, and calculi in the kidney or bladder, the irritation of which often determines blood to the penis, and causes morbid erections without any voluptuous sensations or desires. Such appears to be the nature of the influence produced by cantharides, the most common of this class of medicines, and the chief

ingredient of quack remedies for impotency. There are, however, few cases of defective sexual power in which the use of cantharides would be proper. In an atonic state of the organs, in which the erections are feeble, unstable, and insufficient, a small dose of the tincture of cantharides may be given every three or four hours for a short period before the occasion arises for the exercise of their functions. Bayle states that Leroy and Bouttatz experimented on themselves with phosphorus, and found that it produced strong excitement of the genital organs. The same was observed in animals to whom Leroy gave this remedy.¹ Phosphorus seems to act much in the same way as cantharides, irritating and stimulating the urinary organs, and determining the blood to these parts, and no doubt its effects would be equally injurious in many cases of impotency. In certain atonic cases a trial may be made of phosphorus, in doses of gr. $\frac{1}{20}$ th made into a pill with bread crumbs, and given three times a day, or at the periods indicated for the exhibition of cantharides. I have found the ergot of rye combined with quinine one of the best and safest temporary stimulants to the generative organs. Nux vomica is also in repute as a remedy in these cases, and I have given it in a few instances with apparent advantage. M. Trousseau found nux vomica successful in impotence, but he noticed in some cases, that its effects, like those of other stimulating remedies, were manifested only whilst the patients were taking the medicine. A young man, twenty-five years of age, of an athletic constitution, who had been married for eighteen months without having any other than almost fraternal communications with his wife, acquired his virility under the use of nux vomica, though he again lost it soon after leaving off its employment.² M. Duclos, of Tours, speaks highly of the efficacy of the alcoholic extract of nux vomica. He divides 75 grains into 100 pills, of which he gives one every night, gradually increasing the number every five days until three or four are taken night and morning.³ In addition to these remedies, stimulating liniments may be rubbed into the loins and nates.

The condition to which these aphrodisiac remedies are applicable, is chiefly that in which the intromittent organ is but feebly excited, and does not maintain the physical state necessary for penetration,

¹ Bibliothèque de Thérapeutique, tom. ii, p. 124.

² Pereira's Materia Medica, 2d edit. vol. ii, p. 1305.

³ Bull. de Thérap. t. xxxvi.

or the period of congress. Such torpidity may exist in persons in whom desires are at times strongly felt, and the functions of the testicles properly performed. In these cases, also in timid persons, and in others whose organs are inexcitable from long disuse, stimulating treatment may conduce to success, and insure confidence for the future. But these remedies exert no animating influence in that apathy of the sexual faculty alluded to at p. 310. They also have rarely more than a temporary effect; and in persons advanced in life, when the parts, having fulfilled their office, are experiencing the natural decline, they operate injuriously, and, I believe, tend to produce congestion of the prostate, and local disease. In those cases, also, in which the sexual organs are weakened or prematurely exhausted by excess, they are likewise hurtful as well as fruitless. After such abuses, a period of repose is required, and by the avoidance of all sources of excitement, and by a diet and remedies adapted to invigorate the body, we may hope for a gradual restoration of the procreative functions.

SECTION II.

SPERMATORRHŒA.

It often happens that the passions are excited without an opportunity being afforded for their gratification. The active secretion which takes place under these circumstances is sometimes attended with uneasy sensations in the testicles. In this state, the loaded ducts and seminal receptacles are relieved by ejaculations of the spermatic fluid during sleep. Nocturnal emissions occurring under these circumstances, and most continent persons in the vigor of manhood are subject to them, are followed by a sense of local relief and mental ease, and they thus appear to be a salutary provision to obviate the inconveniences which might arise from unsatisfied desires. The emissions may, however, be more frequent than is consistent with health, and too readily excited, so much so, indeed, as to affect virility, and to give rise to constitutional symptoms of a serious character. These excessive spermatic discharges constitute the complaint termed *spermatorrhœa*. This affection had attracted but little attention from the profession until the publication of Professor Lallemand's well-known work on the disease. His description of its causes and symptoms is impaired by much bad taste and

exaggeration, but he has the merit of having recognized the true character of the complaint, and of having pointed out its injurious effects.

Spermatorrhœa comes on very gradually. It commences by a precipitate emission of semen either in coition or during lascivious dreams. There exists a state of morbid irritability of the organs. The emissions consequently are premature, and without force, and the erections slight and incomplete, and soon subside. As the affection increases, the emissions become more frequent and more readily excited, and are induced merely by erotic ideas or the least contact or titillation, and take place without erection and without pleasure. In this weak and susceptible condition of the organs involuntary pollutions are liable to occur both day and night, constituting a state of passive *spermatorrhœa*, which often lasts for many months, gradually undermining the health. The patient becomes thin, pale, and feeble; has impaired vision, and a sickly languid look; suffers pains in the head and back; is hypochondriacal and apathetic, and unfitted for active bodily or mental occupation. He often experiences uneasy sensations in the testicles, which are soft, and hang low. The scrotum is pendulous and lax, and the spermatic veins are sometimes large and varicose. His symptoms are aggravated after each emission, which is usually followed by a painful sense of fatigue, and malaise, that last many hours.

Spermatorrhœa may be induced in various ways. In persons of strong passions, who make no efforts to subdue them, but indulge in lewd thoughts or in erotic conversation and reading, the testicles are stimulated to active secretion, and if no relief be afforded by commerce with the other sex, emissions are liable to become frequent, and the habit being established, the parts get weakened and irritable, so that the discharges occur under slight provocation. The complaint may also be brought on by excessive indulgence in sexual intercourse. But its most common cause is long-continued and frequent self-abuse, those who give way to this vicious habit being little aware of the evils it engenders. The practice occasionally acquires a complete mastery over the reason and will. In some cases not even the strongest self-control can repress the disposition to abuse; and persons fully aware of the evil results, and actually dreading the consequences, are unable to restrain their fatal desires. In these cases there is a peculiar morbid condition of the nervous

system. Indeed, the debilitating and enervating effects of this affection are far greater than would be occasioned merely by a drain of the amount of the fluid emitted, which is to be ascribed to the nervous exhaustion especially attending the reproductive function. The patient's mind is constantly absorbed with his sufferings; he gives an exaggerated account of his symptoms, finds great difficulty in abstracting his attention from them, and occupying himself with other matters, and eagerly peruses anything relating to his complaint; a circumstance well known to the empirical authors, who are constantly advertising their works on the subject. The condition of these persons is melancholy enough. Aware of the abhorrence with which their practices are regarded, they hesitate to consult the regular practitioner, and fly for relief to ignorant but artful quacks, by whom their pecuniary resources are drained, for which they only meet in return with bitter disappointment. Such is the heavy penalty often paid by man for gross indulgence in sensuality—a degraded nature and a ruined constitution imbittering the best days of his existence, and sometimes even leading to insanity or suicide.

One of the sad results of habitual self-abuse and excessive spermatorrhœa is a morbid condition of the brain, giving rise to epileptic symptoms. In most cases it will be found that the cerebral affection had existed previously, but had become confirmed and aggravated under the excitement and nervous exhaustion consequent on the practice. In others the epileptic paroxysms appear to be caused solely by excessive masturbation.

The matter emitted in spermatorrhœa is thin, and more liquid than healthy semen; but that it is really spermatic is proved by the spermatozoa which it is found to contain. Lallemand, who carefully examined the fluid voided in all stages of the complaint, found the zoosperms less abundant, and less developed and lively, in proportion to the severity of the disease, until at length in very advanced cases they almost entirely disappeared. The discharge is largely diluted with the secretions of the vesiculæ seminales and prostate; and in bad cases of the complaint the fluid emitted consists almost entirely of the latter, mixed with purulent matter, and sometimes a little blood. Occasionally the spermatic fluid, and even the prostatic secretion, pass into the bladder and mix with the urine, with which they are voided. Directions have been given for distinguishing the semen under these circumstances, but they

are not to be depended on; and the only sure mode of ascertaining the existence of semen in the urine is a microscopic examination of the fluid in order to detect the spermatozoa. In cases of this disorder there is often an escape of spermatic fluid with the last drops of urine in micturition. A similar discharge also occurs in defecation, being occasioned by the pressure on the vesiculæ. In some cases this only attends a costive evacuation, but in others is of constant occurrence.

Although this complaint is usually considered and treated as a functional derangement, there are few cases in which the parts remain long in a perfectly sound state. It will be found that the patient experiences a frequent desire to void his urine; that the evacuation is sometimes attended with slight scalding; that he occasionally feels pain and heat in the prostatic part of the urethra; and that if a bougie or catheter be introduced as far as this portion of the canal in the most gentle manner, it causes a sharp pain, and sometimes strong spasmodic contractions, the instrument being at the same time grasped in the canal. The prostatic and membranous parts of the urethra are indeed in a state of morbid irritation; and I believe that the increased secretion of the testicles, the hasty ejaculations, and inordinate desire for sexual indulgence or self-abuse very greatly depend on this morbid condition of the mucous membrane. Nor is it surprising, considering how much this part of the urethra is concerned in the function of generation, that a permanent state of disease should be produced by the frequent excitement of sexual excesses. Involuntary spermatic discharges are sometimes induced by gonorrhœa affecting the prostatic part of the urethra. Their origin has also been ascribed to certain affections of the prepuce and of the rectum and skin; but these are quite secondary causes, and are incapable of producing involuntary emissions without a more direct source of excitement, or a state of morbid irritability at the orifices of the ejaculatory ducts.

I know of no instance in which an opportunity has been afforded of making an anatomical examination of the parts affected in the early stage of the complaint. Lallemand examined them in two very severe and complicated cases of the disease, in which the patients labored under symptoms of cerebral congestion before death. I also carefully dissected them in an aggravated case, in which the patient was comatose for several hours previous to dissolution.

In all three the morbid appearances were of the same character. The mucous membrane at the prostatic part of the urethra was swollen and injected. The prostate was nearly destroyed, and converted into a multilocular abscess, or a number of alveolæ or cells, communicating with each other; and the diseased mucous membrane covering it was riddled with holes, formed by a considerable enlargement of the original orifices of the gland, through which pus or altered secretion freely escaped on pressing the prostate. As Lallemand aptly remarks, the membrane at this part covers the multilocular cavity of the prostate, much in the same way as the cribriform plate of the ethmoid bone covers the nasal fossa in the dried skull. One or both vesiculæ seminales were infiltrated with pus, and their walls thickened by inflammation. The orifices of the ejaculatory canals were enlarged and abraded. When the prostate is affected, slight pain is occasioned by pressing on it through the rectum, and there is usually a discharge from the urethra when the patient is at stool.

The morbid condition of the mucous membrane of the prostatic part of the urethra, though not the original cause of spermatorrhœa, when established, tends materially to excite both the excessive seminal discharge and the secretions of the prostate, and to produce that morbid craving for indulgence and abuse which persons who have brought themselves to this state find so difficult to repress and resist. It is well known that any irritation at the orifice of an excretory duct usually acts as a stimulus to the secretions of the gland. Thus hurtful matter in the duodenum produces a flow of bile; and a foreign body on the conjunctiva, as an inverted eyelash, a discharge of tears. So it is with the testicle when irritation exists at the orifices of their excretory ducts. The disorder at this part, moreover, appears to react on the brain, and to become in part the cause of the patient's mind being constantly occupied with subjects of sexual excitement, and of his indifference and apathy in respect to other matters. So that the local disease induced by abuse powerfully aids in perpetuating the mischief, and consequently becomes the object to which, in many instances, our treatment should be first directed. Certainly, in severe and confirmed cases, until the morbid condition of the mucous membrane of the urethra is corrected, we can scarcely hope to relieve the seminal emissions, or to recruit the patient's health and strength; and when it is removed,

there is far less difficulty in inducing him to abandon his injurious habits, and in improving his general condition by other treatment. In some persons there appears to be a predisposition to this complaint, which is indicated by feeble sexual powers, irritability of the bladder, and incontinency of urine in early life.

It is necessary to remark, that in persons whose constitutions are suffering from frequent seminal emissions, it is not always easy to ascertain the real cause of impaired health. Either from not suspecting it, or unwillingness to confess, patients are apt to refer their complaints to anything but the true cause. They complain of indigestion, palpitations, pains in the head, and other anomalous symptoms, but neglect to mention the emissions; so that some tact and cautious inquiry are often necessary in order to discover the nature and source of the malady with which they are afflicted. There is something, however, in the appearance and bearing of many of these persons,—their shy and furtive glance, pallid and pasty complexion, want of frankness and incoherent account of their symptoms,—which generally enables the practitioner to form a shrewd guess as to the true cause of the mischief.

In a great proportion of the cases which come under notice in practice, the complaint is extremely slight, or more mental than real. The ability to perform well the duties of the sex is a matter of such concern to most men, that it is not surprising that timid or weak persons, misled by artful advertisements and empirical works, should sometimes be troubled with unfounded fears, and fancy that they are incompetent and laboring under spermatorrhœa when no such disorder exists. The minds of these persons are usually more or less unhinged by dyspepsia, and the discharges natural in health are regarded as morbid. They are reminded, in the writings alluded to, of having once practised the foolish habits common in schools, and too little restrained by teachers, but which have been long abandoned and have left no permanent ill effects. I have met, indeed, with men, even of great intelligence, who have been so impressed with the conviction of being seriously affected with spermatorrhœa, and who have been so unhappy in consequence, without any real cause, that their condition has amounted almost to monomania. Care is required in dealing with these cases. Medical men are too apt to treat the complaints of such patients lightly, making no efforts to allay their anxiety—a course which often leads them

to apply for aid in illegitimate quarters, and to become the victims of unprincipled men. The surgeon should endeavor to obtain the patient's confidence, and whilst paying due attention to his general health, should strive to convince him of the groundless nature of his fears, and of the unimportant nature of his local complaint.

Solitary abuse is sometimes practised in infancy; and cases have come to my knowledge in which it occurred at the early age of between three and four years. The sexual organs were not prematurely developed, but in one of them the child had passed a small calculus. The vice has been ascribed to the irritation produced by worms in the rectum; but I believe it is more often induced by the foolish habits of children and their associates. Though little fluid is emitted, the practice is very injurious to the constitution by its effects on the nervous system, and prevents the development of the sexual powers. As in the adult, it produces a morbid sensibility and condition of the urethra, which is to be treated on the same principles.

Treatment.—The treatment proper in spermatorrhœa varies greatly in different cases, depending much upon the patient's mental condition, physical powers, and general state of health, as well as upon the cause, degree, and duration of the complaint. In slight and recent cases connected with dyspepsia, attention to diet and remedies which correct the unhealthy actions of the alimentary canal, and medicines taken at bedtime to relieve or prevent acidity during the night, coupled with cold bathing and active exercise, will be sufficient to stop the frequent discharges. When the complaint occurs to persons of depressed vital powers, and is accompanied with deposits of the phosphates or oxalates in the urine, diet of a tonic character, quinine with acids and tincture of henbane, relief from mental toil, exercise without fatigue in a pure dry air, and in some cases an opiate at bedtime, are the remedies calculated to give relief. Indeed, in the class of cases alluded to, the spermatic discharges are only symptoms of general derangement to which the patient has ascribed undue importance; and as the health improves under treatment, the discharges become less frequent and less a source of anxiety.

When the complaint is slight or chiefly mental, and unattended with weakness or impairment of the general health, the most effectual remedy is moderate but regular sexual intercourse. It tends

to correct the irritable condition of the organs giving rise to precipitate ejaculation, and removes the disposition to self-abuse. There are some obvious difficulties in the way, and persons who have never ventured on connection, or have failed in the attempt, have to overcome the apprehension of incapacity. In robust persons who remain continent, but do not exercise sufficient restraint on their thoughts, athletic exercises, active occupations of various kinds, indeed any engrossing pursuit, will materially assist the cure. One patient, a gentleman of great intelligence but without occupation, assured me that his recovery was greatly promoted by his engaging in the study of chemistry, to which he applied himself with great zeal. In some cases, certain sedatives, such as lupulin, camphor, and henbane, may be taken at bedtime with advantage. They quiet the mind, promote repose, and allay irritability in the sexual organs.

In cases of spermatorrhœa, slight but of some duration, and induced by abuse, the local irritation and morbid state of the prostatic part of the urethra may generally be corrected by the occasional introduction of a plated steel sound. I usually employ one of the size of No. 10, pass it very gently about once a week, and retain it in the canal for five minutes. Its influence may be aided by the cubeb powder. In persons of feeble or impaired constitution I give it with the compound infusion of roses and dilute sulphuric acid, and often combine the sulphate of quinine. Or I prescribe the tonic medicine for the day, and order at bedtime a draught containing two scruples of cubeb powder, five grains of carbonate of ammonia, and half a drachm of tincture of henbane. In persons whose general health remains sound I often give small doses of the bicarbonate of potass with the cubebs three times a day. Under this treatment, variously prolonged and modified, the morbid condition of the prostatic part of the urethra is corrected, the health improves, the discharges become less frequent, and cease to occur without erection or to be a source of weakness. At this period, moderate sexual intercourse contributes to the patient's permanent recovery, and prevents a return to bad habits, though in the earlier stages of treatment it is improper.

In bad and confirmed cases of this disease the local application of the nitrate of silver is the most effectual means of restoring the prostatic part of the urethra to a sound state. It allays the mor-

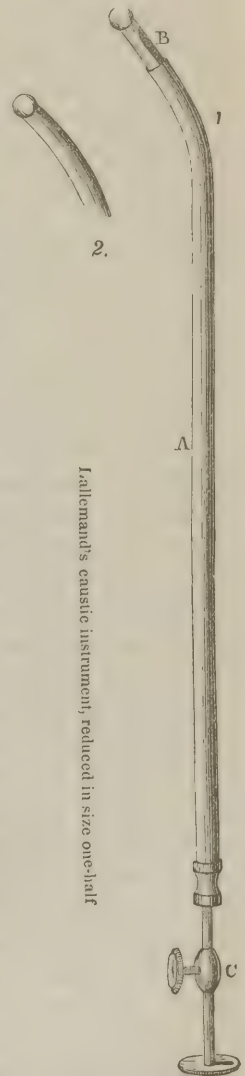
bid sensibility and corrects the altered condition of the membrane and orifices of the ejaculatory canals, and thus arrests the excessive secretions of the testicles, vesiculæ, and prostate. The nitrate of silver when applied to the diseased part of the urethra, appears to act on the seminal vesicles and follicles of the prostate gland, very much in the same way as a stimulating application to the conjunctiva of the eye relieves a morbid condition of the membrane of the nasal sac or duct by being absorbed at the puncta lachrymalia. The dissolved caustic entering at the enlarged orifices at the sides of the veru montanum thus reaches the interior of these glands. The beneficial effects of the nitrate of silver in this affection appear to have been known to Sir E. Home, who, in his work on Strictures,¹ has recorded two cases of seminal emissions consequent upon onanism, which were much relieved by the application of the armed bougie. His mode, however, of using this remedy was very defective; and the plan of treatment does not seem to have been followed by other surgeons in these particular cases. It is to Lallemand that we are indebted both for showing the value of the caustic treatment of this complaint, and for devising an improved instrument for making the application.

Lallemand's instrument consists of a slightly-curved platina canule or tube, rather smaller than a middle-sized catheter (Fig. 44, 1, A), through which plays a caustic-holder, having at its further extremity a narrow groove, eleven lines in length (B), for the purpose of receiving the caustic. After filling the groove with the nitrate of silver by fusing it over a spirit lamp, the caustic becomes so securely fixed that there is no danger of its escaping. At the other end there is a sliding screw or stop (c), by which means the application of the caustic may be limited to any extent less than the length of the groove which contains it. In employing this instrument I proceed as follows:—Having regulated the caustic-holder so as to admit of nearly the whole of the groove being uncovered, and having closed the instrument so as to conceal the caustic (Fig. 44, 2), I introduce it well oiled as far as the prostatic part of the urethra, its arrival there being easily ascertained by the pain experienced by the patient, and by my being able, after the instrument is depressed and has passed the triangular ligament, to carry it freely onwards. I then thrust forwards

¹ Vol. ii, p. 427.

the caustic-holder, and after passing it once or twice backwards and forwards instantly close the apparatus, and then withdraw it. The dissolved caustic readily reaches all the parts to which the application is required. Other forms of instrument for applying the nitrate of silver have been suggested and recommended, but I have found none more convenient or better adapted to the purpose than Lallemand's. It is important that the knob at the extremity of the caustic-holder should be of sufficient size to project beyond the canule, or else the mucous membrane is very liable to be caught at this point in the closing of the instrument, and a portion of the membrane to be stripped off in its removal from the canal. When used in the transient manner I have just described, the caustic occasions a sharp smarting sensation, which subsides, however, in about ten minutes. On making water afterwards the patient experiences scalding, and usually passes a little blood with the last drops of urine, and sometimes has a slight purulent discharge, which continue for twenty-four or thirty-six hours, and then gradually cease. If much pain or retention of urine should result from the application, it may be relieved by a warm hip-bath, and opiate suppositories or injections. I have never found the caustic produce so much hemorrhage and such severe symptoms as are described by Lallemand occasionally to arise from it, which I attribute to the more gentle manner in which the application is made. The only instance in which retention of urine has occurred, in my practice, was in the case of a gentleman who neglected my injunction to remain at rest after the operation, and he was instantly relieved on taking a warm bath. The patient should remain quiet at home for twenty-four

Fig. 44.



Lallemand's caustic instrument, reduced in size one-half

hours, and take no walking exercise, or malt liquor or wine, until after the slight bleeding has quite ceased. I usually order, for a night or two after the operation, some opium or henbane to procure rest and allay irritation, and order the patient to take freely of demulcent drinks.

In general, the emissions gradually cease to be too frequent, and to occur without erections, after one or two applications of the caustic: I have rarely had occasion to repeat it a third time. Indeed, if the remedy does not succeed in giving tone to the parts, and in checking the discharges after one or two applications, they are not likely to be removed by more frequent renewal. The cauterization should not be repeated sooner than a month or six weeks. It is impossible to judge fairly of its effects in a shorter period, and I most commonly wait three months. In all cases, I pass, after a few weeks, a No. 10 sound, in order to satisfy myself that the canal has not been injured by the treatment. In the many cases in which I have used the caustic, with two exceptions, I have never observed any subsequent ill effects which could be ascribed to the remedy. In the exceptional cases alluded to, a stricture formed at the membranous part of the canal. In one, the contraction was extremely slight and yielded readily to dilatation. In the other, the contraction was closer, and the passage of sounds was required for six weeks, but the stricture was at length quite cured, and was found to have remained so six months after the dilating treatment had ceased.

Since the publication of Lallemand's work, the caustic has been extensively resorted to in spermatorrhœa, but much difference of opinion exists in respect to its value. It is regarded by some surgeons, who have never tried it, as a remedy worse than useless, and others who had employed it, expecting perhaps too much, have been disappointed. This discrepancy is not surprising when we consider that the caustic treatment has not only been unduly extolled, but has been used in unfit cases, as well as too freely and too frequently. In the cases in which I have recently resorted to this treatment, it has rarely failed to afford more or less relief. The caustic must not, however, be expected to operate like a charm. The irritation which it produces sometimes even increases the emissions for a time, and it is only as the parts recover from its first effects that any benefit is manifested. Nor does the caustic super-

cede other treatment. It must be viewed as only one of the means necessary in certain cases for the cure of the complaint. Sedatives, tonics, and moral treatment are required to assist its action, or confirm the good effects obtained from it. But, it must be admitted, that the caustic is an uncertain remedy, and those who reckon too confidently on its favorable influence will sometimes meet with disappointment. In many cases it acts with marked benefit; whilst in others but little, if any, advantage is derived from it. It need scarcely be added, that no method of treatment is likely to be successful or permanent, without the most rigid and persevering abstinence in respect to the exciting causes of the complaint. All subjects capable of exciting erotic ideas should therefore be strictly avoided; and it must be recollected that a relapse is readily induced by the least imprudence or excess. Persons suffering from spermatorrhœa are often recommended to marry. In severe cases of the complaint this advice is not only unsound, but actually injurious; and if followed, which I believe rarely happens, would be a cause of much misery. Persons thus affected are by no means in a condition to enter the marriage state; they are in fact impotent; and nothing is more calculated to aggravate their complaints and impede recovery, than the excitement of the sex and fruitless attempts at sexual indulgence. The indications afforded in these cases are, to arrest the debilitating discharges; to obtain a period of rest during which the parts may recover their tone, the health may be reinstated, the constitution invigorated, and the appetite recalled by abstinence. When this is effected, but not till then, marriage is desirable, as it takes away the temptation to solitary vice, and is favorable to regularity and moderation in the performance of the reproductive functions, and thus obviates the tendency to a relapse. As the local affection subsides, we must have recourse to remedies to improve the general health. Thus steel medicines, quinine, cold bathing, a nutritious but not stimulating diet, due regulation of the bowels, change of scene and exercise in an open pure air, and cheerful occupation, prove very beneficial in these cases.

Solutions of the nitrate of silver and stimulating ointments have also been applied to the prostatic part of the urethra by means of instruments constructed for the purpose. I have tried them in a few cases, but have found them less effectual than the solid caustic.

There are certain remedies which are reputed to have a special influence in checking atonic spermatorrhœa. M. Duclos reports strongly in favor of the extract of *nux vomica* (see formula at p. 325), combined with frictions on the loins and inner and upper part of the thighs with a stimulating liniment. The ergot of rye has also been recommended in these cases, in doses of a quarter of a grain night and morning. Mechanical contrivances to prevent patients sleeping on the back will sometimes help to arrest the night discharges. In some cases the removal of an elongated prepuce has been attended with a good effect. In lads addicted to masturbation this operation is very effectual. It at once breaks the habit, which, in many instances, is not afterwards renewed.

Persons troubled with seminal emissions which no effort of the will can prevent their provoking, or which persist in spite of medical treatment, have in some instances been solicitous for the removal of the testicles, to get rid of the disgusting complaint; and individuals have even been known to perform the operation of castration on themselves.¹ Some years ago I received from a patient thus affected two letters urgently requesting me to remove his right testicle, his left having been extirpated by a surgeon some time previously. This man refused to submit to any other treatment for his complaints, being impressed with the idea that this operation was the only remedy that could relieve him. He was a patient of the late Mr. Avery, who, as well as myself, was teased with repeated solicitations to castrate him; and he at length succeeded in inducing a surgeon to perform the operation. Castration is not justifiable in any case of mere involuntary seminal emissions; nor is any surgeon warranted in complying with the unreasonable wishes of a monomaniac. Unless important organic changes have taken place in the genito-urinary organs, the affection is certainly remediable by judicious treatment steadily pursued; whilst the operation of castration, even if effectual in relieving the symptoms, would leave the patient in a state of mutilation which might afterwards prove a source of the most bitter regret. I have been informed by a professional friend of a case in which double castration was performed, at the urgent request of the patient, on account of most distressing self-pollutions, that had a very lamentable result. The patient, a gentleman in the upper ranks of life, committed

¹ Several cases of self-castration are related in Chap. III, Sect. II.

suicide ; and the surgeon, who had been rash enough to emasculate him, was threatened by the patient's friends with an action at law for performing so unwarrantable an operation.

CHAPTER XIX.

CASTRATION.

CASTRATION, or excision of the testicle, is an operation of great antiquity, and was formerly one of the most common in surgery. Even at the present day it is frequently performed by the barbarous people of the East to deprive their slaves of manhood ; but this cruel practice is now rarely resorted to in Europe, except for the removal of disease, being uncommon even in Italy, where it was once frequently performed on account of its effects on the vocal organs.

The diseases which may lead to the necessity for castration are the different forms of carcinoma, incurable struma, abscesses and tedious sinuses consequent on inflammation, and cystic disease. The circumstances under which the operation is admissible in these various diseases have already been considered.

Castration is an operation simple, easy of performance, and nearly free from danger ; but painful, owing to the large number of nerves and great sensibility of the parts incised. Patients generally prefer, therefore, being rendered insensible by chloroform. The hair must be first cleanly shaved off from the pubes and scrotum. The only instruments required are a straight bistoury or large scalpel, a pair of forceps, tenaculum, and curved needles armed with ligatures. The patient is to recline upon a table of convenient height, and the operator is to place himself on the right side ; or he may seat himself between the patient's legs. An incision is to be made from about half an inch below the external ring, along the front of the tumor to the bottom of the scrotum. The envelopes of the cord and testicle, the layers of thickened fasciæ, and the cremaster muscle are then to be freely divided, nearly as high up as the abdominal ring. If this part of the operation be interrupted by bleeding from any of the branches of the external pudic artery, it will be well to

secure them with ligatures. In detaching the diseased gland from the scrotum, the surgeon may employ traction, so as to lacerate the connective tissue. In chronic cases of disease, this tissue is often too condensed and thickened to admit of being thus torn: and in nearly all instances the dense adhesion between the lower part of the testicle and the scrotum requires division with the knife. When the tumor is of large size, care is necessary to avoid wounding the urethra and corpus cavernosum, and also the opposite gland, which should be drawn aside by an assistant. As soon as the spermatic cord is detached from the surrounding parts and fully exposed, it is to be grasped between the finger and thumb of an assistant to prevent its retraction within the inguinal canal after being divided, and it is then to be cut across by a single stroke of the knife. Some surgeons are accustomed to secure the cord by passing a tenaculum or needle and ligature through it; a plan which need only be adopted when it is necessary to divide the cord very high up, as in general the fingers of an assistant are sufficient for the purpose, and give less pain and produce less disturbance of the parts than the other method. The arteries of the cord can now be secured. The spermatic artery is soon found, and is to be tied separately. The artery of the vas deferens must next be sought for near the duct, and also tied. This vessel is so small that it is not always apparent; but the surgeon should endeavor to secure it, as it is sometimes the source of a troublesome hemorrhage after the conclusion of the operation. The vessels of the scrotum are next to be tied; if the tumor be large, or the disease of long standing, they are likely to be numerous. The ligatures attached to the cord being carried to the upper angle of the wound, the divided edges are to be brought together by three or four sutures or more, according to the length of the incision. Strips of plaster are not sufficient, as the natural contractility of the scrotum tends to separate and evert the edges of the wound. Its closure is to be completed by a compress of lint retained by plaster and a T bandage. The wound usually heals in from fourteen to twenty days.

There are some few circumstances of importance to be attended to in this apparently simple operation, and certain modifications are sometimes required. The operator should be careful to carry the first incision to the lowest part of the scrotum, as by this means he not only facilitates the detachment of the tumor, but afterwards

prevents the bagging of matter in the scrotum. If the gland be of very great size, or if the skin be adherent to it and diseased, it will be advisable to remove a portion of the scrotum. Instead, therefore, of a single straight cut, two lunated incisions should be made, so as to include an oval piece of the integuments. By this means, if the skin be adherent, a tedious dissection is avoided; or, if the tumor be very large, the inconvenience of a bag of useless integument may be obviated: the hemorrhage, also, will be less; and the vessels requiring ligatures will not be so numerous. It must be borne in mind, however, that the scrotum contracts so much after the removal of its contents, that in tumors of considerable size there is seldom a necessity to excise any portion of the integuments. In the excision of such tumors the drawing up of the cord after its division is liable to become a source of embarrassment and delay. The retraction is usually ascribed to the action of the cremaster; but as the greater part of this muscle, together with the organ upon which its action is exerted, is cut off at the division of the cord, the retraction must be chiefly due to the elasticity of this part, so that, after the cord has been relieved of the weight of the enlarged testicle by which it was dragged down, it recovers its former position. The surgeon should take care to divide the muscular and fascious envelope of the cord before cutting it across; as, if this be neglected, some difficulty is likely to be experienced in tying the vessels after its division. In cases in which the cord has retracted within the abdominal ring, the surgeon has been obliged to divide the tendon of the external oblique muscle, in order to get at the bleeding vessels. In a case which came under the observation of Sir A. Cooper, the bleeding from the vessels of the retracted cord was so profuse, that the operator was convinced he had wounded the iliac artery, and unfortunately proceeded to place a ligature on that vessel. The patient died the day after the separation of the ligature. The iliac artery, though not wounded, had been tied securely enough; but the vessels of the cord, the source of the hemorrhage, had been neglected. Mr. Benjamin Bell mentions two instances of patients having lost their lives from hemorrhage, in consequence of retraction of the cord before the vessels were properly secured.¹ This ought never to happen; for the bleeding arteries may always be reached by laying open the inguinal canal. But this proceeding

¹ Treatise on the Hydrocele, &c. p. 265.

increases the dangers of the operation, in consequence of the proximity of the peritoneum. Mr. Fergusson mentions a case in which the operator had to pursue the vessels into the canal; inflammation within the abdomen ensued, and carried the patient off within three days.¹ When the vessels of the cord are not properly secured, and afterwards bleed, the connective tissue becomes so infiltrated with blood that the surgeon not only experiences great difficulty in finding the bleeding vessel, but the disturbance occasioned by the effusion is liable to induce inflammation and suppuration; and abscesses from this cause have been known to extend to the iliac fossa. It was formerly the practice to arrest the bleeding from the arteries of the cord by tightly tying all the parts composing it in a single ligature. This rude proceeding, by compressing the spermatic nerves, occasioned severe suffering and inflammation, and sometimes was the cause of tetanus. It was consequently pretty generally abandoned, though I find it is still recommended in the removal of the testicle when affected with malignant disease, on the ground that it enables the surgeon to divide the cord higher up than he otherwise could. A case, however, in which the disease had extended so far up as to need a high division of the cord would scarcely be fit for an operation.

Unless care be taken, the operation of castration is liable to be succeeded by secondary hemorrhage. In morbid enlargements of the testicle the scrotal vessels as well as the spermatic undergo considerable increase in size, and pour out blood freely when divided. Mr. Sharp castrated a man whose testicle weighed above three pounds, where some of the vessels were so exceedingly varicose and dilated as nearly to equal the size of the humeral artery.² I have myself found the spermatic artery of a testicle which was removed in consequence of its being affected with malignant disease, as large certainly as the radial artery at the wrist. From exposure to the cold atmosphere and the corrugation of the skin, or in consequence of the patient becoming faint, the bleeding from many of the vessels of the scrotum often stops in the course of the operation; but as soon as the patient becomes warm in bed, and the scrotum relaxes and the circulation is restored, the vessels again begin to pour out blood. On this account many surgeons prefer waiting an hour or

¹ Practical Surgery, third edition, p. 762.

² Treatise on the Operations of Surgery, p. 52.

two after the patient has been put to bed before closing the wound, in order to insure him from so unpleasant and painful an occurrence as the disturbance of the dressings and reopening the wound to arrest a secondary hemorrhage; and this precaution I should always recommend, whenever vessels particularly large and numerous appear to cease bleeding from the effects of syncope or cold. Gentle pressure on the scrotum by a dossil of lint applied over the wound, and retained by strips of plaster or a bandage, is usually, however, sufficient to prevent a return of hemorrhage. There is certainly less bleeding from the vessels of the scrotum when the connective tissue has been lacerated, than after it has been divided with the knife. In one case, in which I operated in this way, although the testicle was of considerable size, not a single scrotal vessel required ligature, and there was no after-hemorrhage.

There is a very rapid mode of performing castration which answers very well when the diseased testicle requiring removal is quite small in size. The surgeon, grasping the gland in his left hand, and dragging it forwards so as to put the integuments on the stretch, may excise it with one stroke of the catlin. The vessels are then to be secured, and the wound closed with sutures.

The disease of the testicle requiring castration may be complicated with scrotal hernia. In such a case the parts must be returned, if possible, into the cavity of the abdomen, and protrusion prevented during the operation by the fingers of an assistant; and the surgeon should carefully endeavor to dissect away the cord without wounding the hernial sac.

In one case of extirpation of the testicle, Sir E. Home relates, "After the operation was completed, and the wound dressed, the patient being seized with a fit of coughing, to the astonishment and dismay of the surgeon, the dressings were forced off by a protrusion of several convolutions of small intestines: from this it was proved that the patient had had a hernia; but the diseased enlargement of the testicle had acted as a truss, and prevented the rupture from coming down."¹ If the diseased gland be of great size, the practitioner will do well to satisfy himself respecting the existence of hernia before commencing this operation, as it is liable to be overlooked. On removing a large carcinomatous testicle, I accidentally opened, on dividing the spermatic cord, a hernial sac containing a

¹ Observations on Cancer, p. 236.

small piece of omentum, of the existence of which I was not aware. A compress was applied at the groin, and no ill effect resulted: the patient recovered favorably. Dr. Wedemeyer, of Hanover, removed the left testicle of a patient who had also, on the same side, a reducible scrotal rupture of considerable magnitude. The rupture, which was reduced at the time of the operation, did not subsequently protrude. Considerable inflammation supervened after the operation; and it is presumed that the descent of the intestine was prevented by adhesions formed during its process in the track through which the rupture had originally passed.¹

Several instances in which a testicle retained in the inguinal canal has become so diseased as to lead to the necessity of castration are on record. Mr. Pott mentions a case of diseased testicle in the groin successfully removed by operation at St. George's Hospital.² In 1823, Manzoni, of Florence, extirpated a cancerous testicle retained within the abdominal ring. A similar operation was shortly afterwards performed at Pisa for the removal of an enormously enlarged cancerous testicle, and the canal was laid open even into the abdomen. The patient recovered from the operation; the disease, however, returned in the glands of the mesentery, and he died two years afterwards from the relapse.³ Professor Naegele extirpated an enlarged and diseased testicle from the left groin of a man twenty years of age. The peritoneum was wounded, and a portion of epiploon protruded. The man survived the operation; but the disease, which is said to have been carcinomatous, returned a month afterwards at the cicatrix of the wound.⁴

The excision of a testicle detained in the groin and affected with encephaloid cancer has been performed in London, in late years, by Mr. Arnott, at the Middlesex Hospital,⁵ and by Mr. Robert Storks, of Gower Street.⁶ In both instances, the enlarged gland was removed without opening a communication with the abdomen. In Mr. Arnott's case, the patient proceeded favorably up to the twelfth day,

¹ *Journal für Chirurgie*, band ix, stück 1; as quoted in *London Med. and Phys. Journal*, vol. lvi, p. 482.

² *Lib. cit.* 4to edit. p. 356, Case III.

³ *Fragments d'un Voyage Médicale en Italie*, par T. J. E. Petrequin; *Bulletin Médicale*, Belge, Juin, 1837.

⁴ Quoted from a German Journal in *Archiv. Gén. de Médecine*, t. xiii, p. 423, 1837.

⁵ *Medico-Chirurgical Transactions*, vol. xxx, p. 9.

⁶ *London Medical Gazette*, vol. xxxix, p. 101.

when he was attacked with erysipelas of the face and head, of which he died in three days. On examination, a small deposit of enccephaloid substance was found on the right spermatic cord just within the inner ring, and a large mass in the root of the mesentery, which, owing to his being fat, had not been detected during life. In Mr. Stork's case the patient survived the operation fourteen months, when he died of the same disease developed to a great extent in the abdomen.

The excision of a diseased testicle from the groin, even when the tumor is of large size, is not a difficult proceeding. But in consequence of the obscurity of the diagnosis, which is much increased by the situation of the gland, the operation, in the first instance, must be simply exploratory. The incision should be made in the same direction as in operating for inguinal hernia, but a little higher up. The tendon forming the anterior boundary of the canal might be divided upon a director introduced at the ring, so as to expose the diseased gland. The surgeon, having opened the tunica vaginalis, would then proceed according to circumstances. The danger is certainly greater than after the excision of a testicle from the scrotum, owing to the liability of wounding the peritoneum, opening a vaginal sac communicating with the abdomen, or interfering with a testicle adherent to intestine or omentum. A diseased testicle, therefore, in this position is unfavorably situated for an operation, especially if the subject of malignant affection, since it would be impossible to determine beforehand with any degree of accuracy, to what extent the disease had reached. In Mr. Arnott's patient there was evidently carcinomatous disease in the abdomen at the time of the operation.

I have remarked that castration is not, under ordinary circumstances, a dangerous proceeding. I have performed and witnessed about thirty operations, and not one of them terminated fatally. In a table of operations performed at the Hôtel Dieu,¹ it appears there were five deaths in twenty-nine cases of castration, being in the ratio of 1 in $4\frac{1}{2}$, which is certainly a high rate of mortality for this operation.

In the first edition of this work I gave to C. J. Maunoir, of Geneva, the credit of having first proposed an operation for the cure of sarcocele, without recourse to the excision of the testicle.

¹ Gazette Méd. de Paris, Dec. 17, 1842.

The operation consists in cutting down upon and tying the spermatic artery, and thus interrupting the supply of blood to the diseased organ. In making this statement, I was not aware that our immortal countryman, Harvey, had not only suggested this operation, but had successfully performed it.¹ Maunoir has detailed two cases in which he adopted the practice with the effect of producing wasting of the enlarged gland.² I know of no forms of morbid enlargement to which the operation is properly applicable. In intractable diseases of the gland with an open sore, castration would be preferable; as cutting off the supply of blood would not assist in healing the wounds, and in malignant affections such an operation would be quite out of the question.

¹ Vide Anatomical Exercitations concerning the Generation of Living Creatures, English edition, 1653, p. 113.

² Nouvelle Méthode de traiter le Sarcocèle sans avoir recours à l'extirpation du testicule.

DISEASES OF THE SPERMATIC CORD.

CHAPTER I.

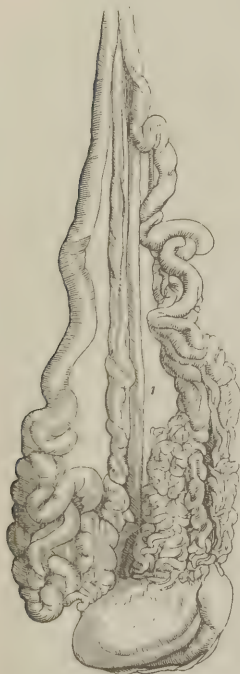
VARICOCELE.

THE term *varicocele* is sometimes applied to designate a varicose enlargement of the veins of the scrotum, whilst the term *cirsocoele* is used to denote a varicose state of the veins of the cord and testicle; but as the scrotal veins are not subject to a degree of enlargement amounting to disease, it is more usual to restrict the term *varicocele* to a morbid dilatation of the spermatic veins.

On dissecting the spermatic veins when varicose, they are found dilated, elongated, and more tortuous than natural, and apparently more numerous, owing to the enlargement of the smaller vessels. In an advanced stage of the disease, their coats are thickened; so that when divided the vessels remain patent, and thus present the appearance of arteries. The enlarged veins hang down below the testicle, and reach upwards into the inguinal canal; and when very voluminous conceal the gland, encroach on the septum, and extend to the other side of the scrotum. In a specimen which I carefully dissected, the vessels were arranged in three clusters (see Fig. 45). One formed of the larger vessels proceeded from the inferior extremity of the testicle; the second, in which the vessels were less in size, but more numerous and tortuous, arose from the upper extremity of the organ; whilst the third and smallest cluster surrounded and accompanied the vas deferens (1). The dilatation is not confined to the veins exterior to the testicle: even those in the gland itself are varicose, and enlarged veins may often be

distinctly seen ramifying between the tunica vaginalis and tunica albuginea. The veins occasionally contain phlebolites, which are lodged in round dilatations of the vessels.

Fig. 45.



The veins of the left testicle are more subject to varicocele than those of the right. In upwards of 120 operations performed by Breschet, in only one instance was the varicocele on the right side.¹ Pott met with this disease on both sides of the body in only one case. The disease, however, is far from being so rare on the right side as is generally supposed, and often exists on both at the same time, although the varicose state of the right spermatic veins is nearly always much less than that of the left. Of 3911 recruits rejected for varicocele in Great Britain and Ireland during the ten years ending 31st March, 1853, 282 had the disease on the right side, 3360 on the left, and 269 on both sides.² Landouzy, who has written a work on this affection containing much accurate information, states, that in eight cases out of seventeen he

found the veins of the right testicle more dilated than natural, though they were much less in size than those of the left. This writer endeavored to ascertain whether any relation subsists between varicocele and varices in other parts. In fifteen individuals affected with varicocele whom he examined, only one had varicose veins of the lower extremities; and in twenty persons with varicose veins of the leg, not one had a varicocele, and no connection could be traced between varicocele and hæmorrhoids. This does not agree with my observations, for in cases of varicocele I have frequently found the superficial veins of the thigh and leg weak, large, and dilated.

¹ Landouzy, *Du Varicocele*, p. 24.

² Statistics of Recruiting, compiled from the Returns in the Army Medical Department. I am indebted to Dr. Smith, the Director-General, for the opportunity of examining these returns.

Of the causes of varicocele, some operate on both sides, others only on one. The most influential of the former is the hydrostatic pressure consequent upon the depending position of these veins, which have to support the weight of a column of blood extending from the testicle to the second dorsal vertebra. The absence of valves is mentioned as a circumstance conducing to this disease: but this is an error, for the larger spermatic veins are always furnished with valves, though the dilatation which takes place in varicocele prevents them performing their office. There are several anatomical circumstances which, taken together, are sufficient to explain the frequency of varicocele on the left side. On the right side the spermatic vein joins the vena cava, nearly parallel to the axis of that vessel, so that the blood enters in the course of the circulation; but on the left side the spermatic vein terminates in the emulgent vein at a right angle, and in a direction perpendicular to the venous current from the kidney, which is less favorable to the return of blood from the testicle, since the two currents pursue a different direction. The left testicle hangs lower than the right; consequently the veins must be longer, and the pressure produced by the column of blood greater on the left side than on the other. The accumulation of the fæces in the sigmoid flexure of the colon previous to an evacuation tends to produce pressure on the spermatic vein, and impede the return of blood from the left testicle, especially in persons whose bowels are habitually constipated. Some persons subject to varicocele suffer from it only when the bowels are in this condition. But even the natural daily accumulation may be sufficient to produce obstruction. To this cause we must chiefly attribute the circumstance, that a varicose dilatation of the veins of the ovary in the female is nearly always confined to the left side.

The occasional causes of varicocele not depending on organization include all those circumstances which tend either to determine the blood in an inordinate degree to the testicles, or to impede its return to the heart, and which operate chiefly by weakening the coats of the vessels. In the first class are abuse of venery, masturbation, and attacks of acute orchitis. The second class comprehends tumors developed in the abdomen; enlargement of the lumbar glands; hernial swellings which press on the cord; trusses improperly adjusted; an accumulation of fat in the omentum

and mesentery; and belts worn round the abdomen. The effects of these mechanical impediments are observed chiefly in persons somewhat advanced in life. Certain kinds of exercise greatly prolonged, as riding and rowing; and sudden and violent efforts, as in straining, also give rise to varicocele. A gentleman consulted me on account of a varicocele, which he attributed to prolonged waltzing. One patient first noticed the complaint after hard cricketing; and another after an attack of hooping cough. That a strain powerfully conduces to the production of a dilatation of the spermatic vessels, may certainly be concluded from the circumstance that the stress to which they are subjected during violent exertion is sometimes so great as to occasion rupture of their coats and extravasation of blood, as was pointed out in treating of hæmatocele of the spermatic cord. Want of the proper support afforded to the testicles and spermatic vessels by the contractility of the scrotum likewise predisposes to this disease. It is partly on this account that varicocele is more common in warm than in cold climates, and in persons of a weakened and relaxed habit than in those of a robust and vigorous constitution, and is more troublesome in warm than in cold weather.

In the slight degree and chronic state in which we most frequently meet with this affection, no injurious effect is produced on the testicle; but when highly or rapidly developed, the dilatation of the veins interferes so much with the nutrition of the gland as to occasion wasting. A partial atrophy of the gland, coexisting with varicocele, has come under my notice in numerous instances; indeed, in nearly all cases in which there was a decided dilatation of the spermatic veins on one side only, the testicle of that side was the smaller of the two. In a man, aged fifty-six, with a varicocele on the left side, the testicle was so reduced that it scarcely exceeded the usual size of the organ in an infant. Some years ago a tall sailor was under my care on account of a varicose ulcer on the left leg, who had a large varicocele on the left side, and a testicle so wasted, that it could scarcely be felt through the tunica vaginalis, which was loosely distended with fluid. We have evidence too that the secreting powers of the gland are impaired, and sometimes even destroyed by this disease.

In forty-five cases in which Landouzy noted the age at which varicocele was first observed, ten having been taken from authors,

and thirty-five having come under his own observation, the age was as follows :—

From 9 years to 15,	.	.	.	.	.	.	.	.	13
15 " 25,	.	.	.	.	.	.	.	.	29
25 " 35,	.	.	.	.	.	.	.	.	3
									<hr/> 45

The results agree very nearly with my own experience. I noted the ages of the last fifty patients who came under my notice; they were as follows:—

From 10 years to 15,	.	.	.	.	.	.	.	.	2
15 " 25,	.	.	.	.	.	.	.	.	26
25 " 35,	.	.	.	.	.	.	.	.	14
35 " 45,	.	.	.	.	.	.	.	.	5
45 " 65,	.	.	.	.	.	.	.	.	3
									<hr/> 50

Many of these patients had been subject to the complaint for months or years before consulting me, which may account perhaps for the ages being greater than in the cases noted by Landouzy.

These tables show that the period of puberty is the time at which varicocele most commonly occurs. I have met with it before that period in but few cases.—A lad, aged eleven, was brought to me with a marked varicocele on the left side. About three months previously he had injured himself in jumping on the back of a boy at school. He was kept on a couch for some weeks, and when he commenced moving about the swelling of the spermatic veins was noticed.—A boy, aged thirteen, had a varicocele on the left side, which was first observed after a fall about a week before I saw him. In both these cases the periodic growth of the testicles had not taken place, and the left gland was smaller than the right.

Varicocele is a common affection, more common, indeed, than is generally supposed: Its prevalence is best shown by the large number of recruits annually rejected for this disease. Of 166,317 recruits medically inspected in the districts of Great Britain and Ireland during the ten years ending 31st March, 1853, 55,474 were rejected. Of the latter, 3911 or 70·5 per 1000, were rejected for varicocele, a greater number, indeed, than the rejections for hernia.¹

There are certain occupations which favor the development of

¹ The rejections for hernia were 1804, or 32·5 per 1000.

varicocele. I have seen many policemen with this affection. The habit of sauntering and standing about for many hours daily tends to produce the disease in those naturally predisposed to it. Several of my patients have been publicans, who are occupied on their feet a great part of the day. The complaint, too, is not uncommon in the men of cavalry regiments. Tall men, also, are more subject to it than short persons.

I have alluded to the thickened condition of the spermatic veins sometimes observed in confirmed cases of varicocele. This thickening is due to chronic inflammation of the outer coat of the vessels. The dilated veins are also liable to diffusive inflammation or phlebitis. This dangerous affection may occur after operations for the obliteration of the plexus, but is undoubtedly rare, and no case of the kind has fallen under my observation. Dr. Escallier has recorded two interesting cases of suppurative inflammation of a large plexus of dilated spermatic veins. They occurred in Paris to persons who were natives of a warm climate, one of them a black from Guadaloupe, the other a merchant from the Brazils. Both cases terminated fatally in a few days, the symptoms simulating those of strangulation.¹

Symptoms.—A varicose distension of the spermatic veins, in general, takes place so gradually, and produces so little inconvenience, that it is often not detected until the affection has made some progress. When somewhat advanced, it occasions a sensation of weight in the testicle, and a feeling of uneasiness in the course of the spermatic cord, which often extends to the loins, and is aggravated by exercise, as riding or walking. The patient is then apt to carry his hand to the scrotum to relieve the sensation of weight, or to give the part a more favorable and convenient position in his clothes. On examination, the scrotum is found to be long, pendulous, and lax; and in persons of a thin and delicate skin has a slight livid appearance, the color of the blood in the veins being indistinctly visible through the integuments. An irregular swelling, of a somewhat pyramidal form, is observed in the course of the cord. This swelling when handled has a soft, doughy, inelastic feel, and communicates to the fingers a sensation which has been compared to that of a bundle of ropes or earthworms. The dilated veins may be traced upwards into the inguinal canal in advanced

¹ Mémoires de la Société de Chirurgie de Paris, t. ii, p. 66.

cases; and when very pendulous they sometimes form a double cone, the testicle being nearly in the centre, and the varicose veins above and below it. In bad and long-standing cases, the veins of the scrotum are also affected, appearing large and tortuous. The swelling is diminished by cold and the recumbent position; and on the other hand is increased by warmth, the erect position, and by straining and coughing. The disease, indeed, is sometimes first discovered by the patient whilst taking a bath, or during an attack of catarrh. The distension of the vessels is also greater towards evening than in the morning. Landouzy has noticed a curious fact in connection with this disease; viz. the marked relief experienced by patients during and immediately after coition, followed by a severe exacerbation of the symptoms the next day.¹ This is owing to the support afforded to the vessels of the part by the tone and contraction of the scrotum, and the increased vigor of the circulation during the venereal orgasm; but as this is only temporary, when relaxation and lassitude ensue the symptoms of varicocele return with greater severity than before. I can confirm the latter observation; patients having several times complained to me of their symptoms being aggravated for several days after sexual connection.

Varicocele, when slight, often remains stationary for a considerable time, neither increasing nor producing inconvenience. This is more particularly the case with varicocele in old people, and also on the right side; so that patients, who have discovered the disease on the left side, remain for years in ignorance of anything wrong on the right, which they believe to be sound, though it contains the rudiments of the same affection that exists on the left. Varicocele on the right side is less voluminous, occasions less uneasiness, and leads to consequences less grave than the same affection on the left.

If a patient affected with slight varicocele avoids fatigue and the exciting causes of the disease, and wears a suspensory bandage, its progress is usually arrested; but if permitted to increase, it is liable to become a source of much annoyance. Slight exertion, warmth, or excitement of any kind increases the local uneasiness; so that the patient is prevented from taking exercise, and is disabled from earning his livelihood by labor. The pain and distress occasioned by this disease vary, however, a good deal, and are not exactly proportionate to the size of the varicocele. In varicoceles

¹ Lib. cit. p. 76.

of large size, the pain is sometimes very slight; whilst in others, small in volume, it is occasionally very severe. Some persons experience uneasiness from a varicocele only when out of health, or laboring under indigestion. Persons afflicted with it at an early age, on the whole, suffer more than those who become affected later in life. The former sometimes labor under a degree of mental distress very much out of proportion to the actual disease. These hypochondriacal symptoms are often connected with spermatorrhœa and dyspepsia, but they sometimes arise from an apprehension, by no means unfounded, of the disease impairing the nutrition of an organ which exercises a marked influence on the characters of the sex. The pain sometimes partakes of a neuralgic character, and is so excessive and intolerable, that patients have gladly submitted to the operation of castration for their relief, which has been performed at the urgent request of the sufferer by Gooch,¹ Brodie,² Key,³ and others.

Though varicocele usually occurs as a chronic affection, it sometimes forms suddenly and advances rapidly, appearing shortly after a severe injury or strain, which had probably occasioned a dilatation of the coats of the veins from which they were unable to recover. There may have been a previous tendency to the complaint; but patients often ascribe its origin to some sudden effort, since which they had experienced the annoying symptoms of the disease. In these acute cases, which nearly always occur in early life, the suffering is much greater than in the more chronic cases. Varicocele has also been known to occur as an acute affection shortly after an attack of orchitis. Mr. Pott has recorded three remarkable cases, in which varicocele made its appearance, not only suddenly and with acute pain, but was attended with very rapid wasting of the testicles.⁴ There seems reason to doubt, however, whether these were simply cases of varicocele.⁵

Diagnosis.—The symptoms of varicocele slightly resemble those of a scrotal hernia. Like hernia, the swelling in varicocele in-

¹ Practical Treatise on Wounds and other Chirurgical Subjects, vol. i, p. 244.

² London Medical and Physical Journal, vol. lvi, p. 299.

³ Sir A. Cooper's Observations on the Testis, p. 224. Vide Case by Mr. Thompson, of Stalybridge, *Lancet*, vol. ii, 1839-40, p. 137.

⁴ Lib. cit. p. 469, Cases XXXVI, XXXVII, and XXXVIII.

⁵ In the first edition of this work, I gave an abstract of these cases, and appended some observations in which I stated my reasons for questioning the propriety of considering them to be examples simply of varicocele.

creases when the patient is in the erect position; subsides spontaneously, or on pressure, when he is in the recumbent; and soon reappears when he again assumes the erect posture. When the dilated condition of the veins extend into the inguinal canal the ring is enlarged, and the swelling increases, and receives a slight impulse in coughing. A varicocele, however, cannot well be mistaken for an intestinal hernia; but the student may sometimes be unable to distinguish the feel of the tortuous and dilated vessels from that of an omental protrusion. The best mode of making the diagnosis is as follows. The patient having placed himself in the recumbent position, the testicle of the side affected is to be raised until the swelling disappears. The surgeon must then press gently with the fingers on the external abdominal ring, and direct the patient to rise. If the case be a varicocele, the swelling soon reappears; but if it be a hernia, the descent of the omentum is prevented by the pressure. As the swelling is reproduced, it commences, if a varicocele, from below; if an omental hernia, from above. In making this examination, care must be taken that the pressure be not too great, or the veins will remain empty. A varicocele might possibly be mistaken for a congenital hydrocele, which likewise swells in the erect position and disappears in the recumbent: the transparency of the tumor in hydrocele is sufficient to set all doubt at rest. Though I have given the above directions, I must observe, that I have never met with a case of varicocele in which there was any difficulty in detecting the nature of the case, or in distinguishing the disease from other affections of the part.

Treatment.—Varicocele in the mild form that is commonly met with, produces little suffering or even inconvenience. The treatment required is to keep the scrotum and testicles well supported, in order to diminish the length of the spermatic veins and the weight of the column of blood circulating in them. For this purpose, the patient should wear a well-fitting suspensory bandage, and as it is desirable for the parts to be kept cool, the suspender should be made of open silk net. Those commonly sold are often badly constructed and do not fit well, so that it is necessary for the surgeon to see that they answer the purpose intended. I prefer the bandage invented by Bourgeaurd, which is secured to the dress above, and is kept well in place by elastic bands round the hips, without any abdominal belt. This suspender braces the parts well

up, and maintains its position in all the movements of the body. It is rendered more effectual by the upper band being connected with a loop which hangs round the neck.

The patient should accustom himself either to souse the parts freely with cold spring water night and morning, or to take a cold hip-bath daily. His lower garments ought to be as light as comfort will admit of, and not tight about the abdomen. Fatiguing exercise, warm baths, excess in venery,—everything, in fact, which tends to determine the blood to the testicles and scrotum, must be avoided. The bowels should be properly regulated, and any disposition to costiveness obviated by gentle aperients, or, what is better, by enemata of tepid water thrown well up into the colon every morning, in order to remove the fæculent collections from this part of the intestine. By these means, if we cannot correct the dilated condition of the veins, we may generally prevent its increasing, and contribute to the comfort and health of the patient.

For the purpose of supporting the testicle in cases of varicoccle, Mr. Wormald, some years ago, recommended the following plan.¹ The lower part of the scrotum, whilst the patient is in the recumbent position and the veins comparatively empty, is to be drawn through a ring about an inch in diameter, made of soft silver wire of a suitable thickness, padded, and covered with wash-leather. The sides of the instrument are then to be pressed towards each other with sufficient force to prevent the scrotum escaping. Patients often find relief from this simple contrivance, and some prefer it to wearing a suspender. I have not found this, however, to be generally the case. The ring is equally annoying to the patient's feelings, and cannot always be steadily fixed so as to answer the purpose intended. Mr. Coulson has informed me of a case, in which the patient compressed the ring so tightly as to cause a slough of the integuments, which, having separated, was followed fortunately by such contraction of the part as to raise the testicle, and afford relief from the uneasy symptoms of the complaint.

In order to afford a permanent and more complete support to the testicle, and to render a suspensory bandage unnecessary, Sir A. Cooper practised a very simple operation; viz. the removal of a portion of the relaxed scrotum, leaving the remaining part to form adhesions and to constitute a natural suspensory bandage. He

¹ Medical Gazette, vol. xxii, p. 194.

recommended this operation only in those cases of varicocele in which the patient suffers great local pain; in cases in which he is most urgent to have the swelling and deformity of the part removed; and more especially in those instances in which the function of digestion suffers, and there is a great degree of nervousness and of mental depression. In slighter cases he employed the suspensory bandage. In the paper¹ in which this treatment is described, five cases are related. In all of them, the painful symptoms of varicocele are stated to have been fully relieved by the operation: four of the patients were operated on by Sir Astley himself, and the fifth by Mr. Key. The son of a medical gentleman of my acquaintance had part of his scrotum excised by Sir A. Cooper in May, 1840. In December, 1842, he had continued relieved from all uneasiness; and the testicle was of proper size, though the veins remained enlarged. In a case operated on by Dr. Watson, of New York, the patient was permanently relieved of the dragging sensation and pains of which he complained before the operation.² In 1841, Mr. Luke performed this operation in the London Hospital on an engineer, aged twenty-one, who suffered considerably from the complaint. A large portion of integument was removed. The wound healed up very slowly, and did not close for six weeks. The testicles were then found to be well braced up and supported, and the man was a good deal, but not wholly relieved of the uneasiness in the groin and cord which he had previously experienced. He resumed work, and I have not since been able to obtain any further account of him. In other cases, the results of the operation have been either unsuccessful or far less satisfactory. Some years ago I examined a man, part of whose scrotum had been excised by Sir A. Cooper for the relief of a varicocele, but so little benefit was derived from the operation that he afterwards submitted to castration. A medical friend informed me that in one of Sir Astley's published cases of success, the disease subsequently returned as bad as ever. In 1849, I was consulted by a man, aged twenty-five, on account of a varicocele, a portion of whose scrotum had been excised at York three years previously with only temporary relief. He still suffered a good deal of aching pain, especially towards evening, and required further aid. The late

¹ Guy's Hospital Report, vol. iii.

² New York Med. and Surg. Journal, Oct. 1840.

Mr. Bransby Cooper published an account of a case in which he performed the operation apparently at first with a successful result; but two years afterwards, it was found that the varicocele had returned, and the patient was obliged to wear a suspender.¹

It is not surprising, when we consider the severity of excision of the scrotum, and the uncertainty of its success in the more painful cases of varicocele for which alone it was recommended, that few surgeons have been led to practise this operation. It is calculated, indeed, to arrest the progress of varicocele, and afford full and permanent relief, only in the milder cases in which the uncomfortable symptoms of the complaint admit of temporary but complete removal by suspension of the parts in the band, or in a well-adjusted suspender; when the artificial contraction of the scrotum succeeds in compensating for the previous laxity of the tissues, gives adequate support to the dilated veins, and sufficiently diminishes the column of blood circulating in them. But as the same object may be equally well obtained in such cases by the use of a bandage, which can be worn without inconvenience, the operation is not advisable.

The attainment of the objects contemplated in the preceding operation, viz., shortening of the scrotum and permanent support to the testicle, has been attempted by Dr. Lehmann, a German surgeon, in another way. His mode of operating, by *invagination of the scrotum*, is very similar to the plan which he has adopted for the radical cure of hernia; but as it does not appear to possess any advantage over the operation of excision of part of the scrotum, and must be liable to even a greater risk of failing in its object, it is unnecessary to detail the steps of the proceeding.

Various attempts have been made to obtain a radical cure of varicocele by causing obliteration of the dilated veins. This has been effected in four different ways. 1. By division of the vessels; 2. By ligature; 3. By compression; and 4. By excision.

1. *Division of the Vessels*.—This operation was first practised by Sir B. Brodie.—A man, twenty-one years of age, was admitted into St. George's Hospital with a varicocele on the left side, principally situated at the posterior part of the epididymis, which, though not very large, caused a very considerable degree of pain, especially in the evening, when the veins were more distended than in the morning. Finding that the pain was referred almost wholly to the

¹ Lectures on Surgery; Lond. Med. Gazette, vol. xliii, p. 356.

cluster of varicose veins situated at the posterior part of the epididymis, Sir B. Brodie was induced to believe that the sufferings of the patient arose from the pressure of the tumor on some contiguous nerve or nerves, and that if the dilated veins forming it could be obliterated the pain would be relieved. With this impression on his mind, he performed the following operation. He divided, with a sharp-pointed bistoury, the skin and cellular texture at the posterior part of the scrotum, so as to expose the varicose cluster; and then, by a second incision, he divided the varicose cluster itself, cutting through its centre. When first exposed the cluster was of about the size of a horse-bean, of a purple color: on being divided it immediately collapsed, and there was a slight venous hemorrhage. Some cold lotion was applied, the wound being allowed to remain open, in order to favor the escape of blood, and prevent its effusion into the cellular texture of the scrotum. Some inflammation and tumefaction of the scrotum followed the operation; but there was no fever, nor much uneasiness of any kind. A month after the operation the wound was healed, and the patient was free from pain. A slight degree of hardness remained where the divided cluster of veins was situated. I have not heard that this operation has been adopted in other cases of the disease.

2. *Ligature*.—Celsus recommended cutting down upon the spermatic veins, and the application of a ligature around them; an operation which has been frequently performed since his day by many of the older surgeons. This operation is adequate to the cure of the disease; but is not free from danger, owing to its liability to induce phlebitis. Sir Everard Home cut down upon and tied the spermatic veins for the cure of varicocoele in a patient in St. George's Hospital. In this case, according to Sir B. Brodie, venous inflammation took place, attended with so much constitutional disturbance that the patient nearly died.¹ It is open, also, to the further objection of occasioning atrophy of the testicle. Delpech, a surgeon of distinction in France, was assassinated by a man whom he had cured of double varicocoele a year before by tying the dilated veins. The patient's testicles were found after death wasted and soft.

¹ Lond. Med. Gaz. vol. xiii, p. 379. I have been informed that several of the patients whose spermatic veins were tied by Roux in Paris, for the cure of varicocoele, died from the operation.

To avoid the risks consequent upon the application of a ligature in the ordinary way, many modern surgeons have had recourse to a plan for the obliteration of the dilated veins, which

Fig. 46.



was first tried by M. Davat on the veins of animals.¹ This plan consists in passing a straight pin or needle through the scrotum, and underneath the varicose vessels, between the latter and the vas deferens, and then twisting a strong silk ligature around the projecting extremities of the pin in the form of the figure 8, with sufficient tightness to compress and flatten the vessels, and arrest the circulation

through them. Inflammation is by this means excited in the coats of the vessels; and the sides of the inner one being retained in contact, the vessels soon become obliterated by adhesion. The pin after remaining in a few days is removed, and the sores produced by it soon heal up. Velpeau and Jobert in Paris have practised this operation with success, and it has also been performed in this country by Liston, Fergusson, and other surgeons with favorable results. The pins should not remain in longer than four or five days, or they are liable to occasion ulceration of the veins, and suppuration in the connective tissue of the scrotum. In large varicoceles, it is necessary to introduce a second or third pin at the distance of from half an inch to an inch from each other.

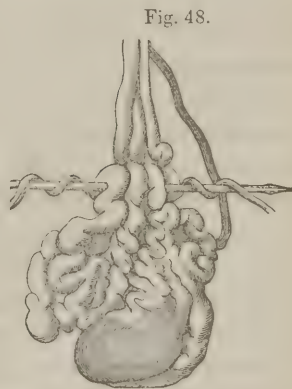
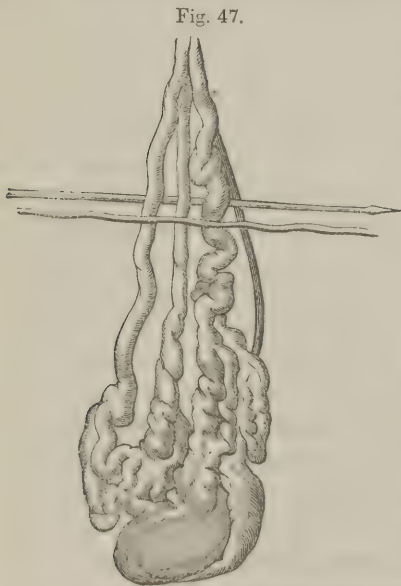
M. Ricord, of Paris, improved upon the preceding method by applying the ligature to the spermatic veins *subcutaneously*. The operation is performed in the following manner:—The vas deferens being separated from the mass of veins, and the latter being pinched up with a fold of the scrotum, a needle set in a handle with the eye near the point, armed with a double-looped thread, is to be passed beneath them. When the needle has traversed from one side to the other, the loop is to be drawn out, the needle retracted, and the veins let go, the skin alone being now held up. A second needle, similarly armed, is then to be passed through, over the veins, entering at the same hole by which the first needle was thrust out, and emerging at the same hole by which it entered.

¹ Vide Archives Générales de Médecine, 11e sér. t. xi, p. 1, 1833.

The second loop is next to be drawn out, and the needle withdrawn. The bundle of veins is thus included between two double threads, of which one passes over, and the other beneath it. The ends of the thread on each side are then to be passed into the loop of the other, and now by drawing those ends in opposite directions the vessels are tied beneath the skin. By this mode of applying the ligatures, the vessels may either be suddenly constricted, or be tied gradually by means of an ingenious instrument—a *serre-nœud*. It would be a simpler proceeding to attach the ends of the ligatures to a ring of india-rubber on each side, which could be secured on the stretch to the upper part of the thigh. In this way traction might be steadily kept up and so regulated as not to cause uneasiness. The vessels are divided, and the ligatures come away in from the tenth to the twentieth day. In 1849 I visited the Venereal Hospital in Paris with M. Ricord, who informed me that he had met with no bad results from this mode of tying the veins; and I saw a case under treatment in which the effects were quite mild.

M. Vidal practises a mode of obliterating the veins by passing a

silver or steel pin behind the vessels, between them and the vas deferens, and then carrying a needle, armed with a fine silver wire, in front of them



Vidal's Operation for Varicocele.

through the same apertures by which the pin passed. Compression is made by twisting the ends of the wire round either end of the

pin, and is gradually increased by the surgeon turning the pin from day to day. The veins are in this way rolled up as well as compressed, until they become destroyed or cut through. The bridge of skin and the superficial veins in front are also divided, or incised on the fifteenth day.¹

Some years ago I witnessed the treatment of a case of varicocele with ligature by Mr. Luke, who used an instrument he terms "a fistula tourniquet," for gradually tightening the ligature.—M. Q., a tall Irishman, aged twenty-four, was admitted into the London Hospital on account of a varicocele on the left side. There was a considerable swelling formed by the varicose spermatic veins, and he experienced a dragging pain in the course of the cord, and an uneasy sensation of weight, which were only partially relieved by supporting the parts. He had been a private in the Light Dragoons, and attributed the origin of his complaint to his testicle having been accidentally struck against the saddle in riding, and he had been invalided in consequence of it about two months. Mr. Luke, having separated the plexus of varicose veins from the vas deferens, passed a straight sewing-needle, armed with a ligature of strong dentist's silk, through the root of the scrotum between these parts; and having attached the ends of the ligature to the tourniquet, secured them so as to make gentle pressure on the veins. The man was then sent to bed. Three days afterwards the ligature was tightened. As the ligature cut through the included parts and got slack it was again tightened. At the end of ten days he was allowed to walk about the ward. The ligature came away on the twenty-fifth day, and on the twenty-seventh the wound was healed. After leaving the hospital he took the situation of a policeman. I saw him at the end of nine months. He was then acting as a horse-patrol, and stated that he was quite cured.

3. *Compression*.—In the preceding operations the veins are pressed upon by the pin or ligature with which they are immediately in contact, and are thereby liable to become inflamed. To obviate this supposed disadvantage M. Breschet contrived a pair of forceps, to cause obliteration of the veins, by making firm pressure on them from outside the scrotum. By means of this instrument, the blades of which are well padded, and admit of being closed by screws, the walls of the dilated veins are at once brought into contact; blood

¹ Vidal, *Traité de Pathologie*, t. v, p. 223.

coagulates in the vessels; and adhesion taking place, the danger to which the other plans are liable is said to be avoided, and by securing the spermatic artery from compression atrophy of the testicle is also prevented. In thirteen cases in which this operation was performed there was only one relapse, which was owing to a vein not being included in the forceps.¹ A writer who witnessed the treatment of several of Breschet's cases, and has reported favorably of the operation, has nevertheless represented the inflammation and swelling consequent upon it as being considerable, and the cure as proving tedious.² It seems, indeed, to possess no advantage over the improved modes of applying ligatures to the veins.

4. *Excision of the Spermatic Veins.*—This operation has been practised by Petit and other surgeons. It is performed in the following manner:—An assistant first separates the vas deferens, which he is to hold firmly and carefully between his thumb and forefinger. An incision from two to three inches in length is then made in the integuments over the cluster of dilated veins. The veins which then protrude are excised with a pair of curved scissors, or divided with a bistoury, first above and then below. If any troublesome hemorrhage afterwards ensue, the bleeding vessels are secured by ligature. A needle and ligature are sometimes passed under the veins at the upper part of the wound, in order to secure them from retraction after their division. The wound is closed by a single suture and adhesive plaster; it often heals by the first intention. Dr. Warren states, that he has been in the practice of doing this operation for a number of years; that he has found it give great relief; that in no instance has it been necessary to repeat it; and that it has never been attended with unpleasant consequences, except in a single instance. In that case, bleeding ensued after the operation, from which the scrotum became so enormously distended that it caused inflammation and sloughing of the cellular membrane and testicle; after which the patient recovered.³ This is a more severe operation than compression, or the ligature, and is also liable to be followed by phlebitis and wasting of the testicle. And besides, it is attended with risk of hemorrhage, and the production of a considerable and troublesome suppurating wound.

¹ Landouzy, lib. cit.

² Vide Observations on M. Breschet's Operation for the Radical Cure of Varicocele, by W. H. Walshe; Medical Gazette, vol. xv, p. 369.

³ Surgical Observations on Tumors, p. 441.

Experience has now fully shown, that the obliteration of the spermatic veins by ligature, in the modes suggested by Davat, Vidal, and Ricord, is, in a great degree, exempt from the risk¹ which attends the operation of exposing and tying vessels in the ordinary way, viz., of inducing diffusive inflammation of the veins. Ricord's subcutaneous ligature, aided by the traction of the india-rubber rings, is the plan to which I give the preference. It is simpler than the methods of Davat and Vidal, in which a portion of skin being included in the compression, there is more pain, and the integument is liable to ulcerate or slough, inconveniences avoided in the subcutaneous operation, which is equally effectual in obliterating the veins, and productive of but little pain and local irritation. Small, however, as is the risk from these improved operations, in no case, not even in the healthiest subject, can the tying of a bundle of veins of such size as the dilated spermatic be regarded as *wholly free* from danger; and it is fortunate that a plan of treatment which I have yet to describe, answers so well in relieving varicocele, that, except in some rare instances, no operation is required for this disease.²

Treatment of Varicocele by Pressure.—A surgeon suffering from a varix in the leg, having heard the late Sir Charles Bell state, in his lectures at the College of Surgeons, in illustration of the fact of the dilatation of a varicose vein being caused solely by the pressure of the column of blood, that if the distended vein be compressed with the finger the swollen condition of the vessel beneath shortly disappears, was led to apply the principle thus indicated to the treatment of his own case, which was attended with a satisfactory result. This gentleman mentioned the circumstance to the late Mr. Key, who was accordingly induced to adopt the same principle in the treatment of a case of varicocele.

In a patient affected with this disease, if the spermatic cord be pretty firmly compressed between the fingers whilst the patient is

¹ In the unfortunate case in which Delpech tied the spermatic veins, atrophy of both testicles resulted. I have heard of other instances in which the gland has wasted after operations for the obliteration of the veins. It is not improbable that in some of these cases the spermatic artery was also included in the ligature.

² A patient who consulted me on account of a slight varicocele and an irritable urethra, afterwards visited Paris, where he submitted to Ricord's operation. On his return he assured me that he suffered more pain in the part than he had done previously.

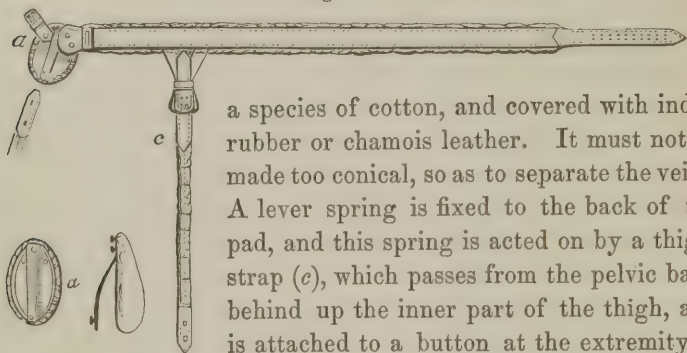
in the recumbent position and the vessels are empty, it will be found, on his assuming the erect posture, that the vessels, instead of swelling as before, still remain empty and contracted. Even, too, when the patient is standing, and the veins are full, if firm pressure be made on the cord, the vessels below, being thus relieved of the superincumbent weight of the blood, will often gradually diminish and become partially emptied of their contents. It was natural, therefore, to conclude, that if the pressure could be steadily continued for a sufficient length of time, it would enable the vessels to recover from the morbid state of dilatation in which they were previously retained by the hydrostatic pressure of the blood. In the case of the varix in the leg, it is clear that the local pressure could have had no effect on the artery by which the vein was supplied, and we may reasonably conclude that the blood in the veins below the point of compression found its way back to the heart by collateral and healthy channels. When the spermatic vessels are compressed in the manner just described, the pressure does not appear to be sufficient to obstruct the spermatic artery; whilst the blood in the vessels below the part compressed, no doubt, returns by the smaller vessels, a sufficiency of which always exists in these cases in an adequately healthy state for the purposes of the circulation. The object, then, of this method of treatment may be stated to be, the maintenance, whilst the patient is in the upright position, of such a degree of pressure on the spermatic veins as may be sufficient to relieve them from the superincumbent weight of the blood, without at the same time endangering the integrity of the testicle by obstructing the spermatic artery, and without causing so much uneasiness as to render the remedy as painful as, or more difficult to be borne than, the disease. This pressure must be continued a sufficient time to enable the coats of the vessels to return to their natural dimensions, and to acquire strength to carry on the circulation. When this is effected the patient is cured. It is obvious, therefore, that the main difficulty of this treatment consists in the application of continuous local pressure. The only part where this can well be made on the spermatic veins is at the external abdominal ring;¹ but unless the pressure be skilfully applied, patients

¹ That pressure at the groin is capable of giving relief in varicocele has sometimes been found out by the patients themselves. Several have mentioned to me, that they had been in the habit, whilst walking about, of pressing on this part with the fingers, having found out that considerable ease could be obtained in this way.

are unwilling to submit to it. Indeed, several cases have come under my notice, in which disappointment has ensued, entirely from the imperfect application of this plan of treatment. The instrument which I have found, after pretty extensive experience, to be best calculated to meet the exigencies of the treatment by pressure is the *moc-main lever truss*.

This truss (Fig. 49) consists of a pelvic band, to one extremity of which a pad (*a*) is attached. This pad is stuffed with *moc-main*,

Fig. 49.



a species of cotton, and covered with india-rubber or chamois leather. It must not be made too conical, so as to separate the veins. A lever spring is fixed to the back of the pad, and this spring is acted on by a thigh-strap (*c*), which passes from the pelvic band behind up the inner part of the thigh, and is attached to a button at the extremity of

the spring. The degree of pressure is regulated by the tightness of this strap. If the thigh-strap be made of strong elastic webbing for about three inches behind, it will yield to the movements of the body, and add much to the comfort of the patient. In double varicocele, pads must be attached to both extremities of the pelvic band, and two thigh-straps are required. Being made without any circular spring, this instrument is not so liable to be displaced as the ordinary trusses. The patient can readily regulate the pressure of the pad, increase or diminish it as may be necessary; whilst the pad itself, being stuffed with a light and elastic material, allows of the requisite pressure being made without causing discomfort. Several instances have come under my notice, in which persons affected with varicocele, after wearing other instruments without the least relief, have derived great comfort and benefit from the lever truss. This method of treatment will be best explained by the relation of a few cases in which it was applied. The following are cases, in which firm, steady, and continued pressure on the spermatic veins at the external abdominal ring succeeded in curing the disease.

Case I. *Varicocele cured by pressure in nineteen months.*—J. II., a tall spare man, aged twenty-two, a cabinet-maker, applied to me at the London Hospital in May, 1843, on account of a varicocele on the left side. There was a considerable bunch of dilated veins above and behind the left testicle, which was about one-third less in size than the right. He had noticed the complaint between two and three years, and it was increasing in size; for the last two years he had worn a suspender, but latterly it had not afforded him the relief he at first experienced from it. He suffered a dull aching pain in the course of the spermatic cord, and this became worse towards evening, and after standing or much exertion. The lever truss was applied on the 8th.—May 11th. The patient complained of uneasiness from the pressure of the truss, but stated that it was not greater than he could easily manage to bear. He was relieved from the aching pain, and there was a decided diminution in the size of the dilated veins, though he had discontinued the use of a suspender; but this he was directed to resume. The truss was ordered to be worn day and night.—June 7th. He had worn the truss constantly, and suffered very little from it. There was scarcely any appearance of dilated veins, and no uneasiness in the course of the cord.—December 20th. On a careful examination of the parts in the after part of the day, the truss being on, no enlargement of the veins could be distinguished. He had become accustomed to the truss, which he wore without inconvenience, taking it off at night.—December 19th, 1844. On examination of the parts after removal of the truss, there was no appearance of varicocele, and the left testicle had acquired the same size as the right. I considered the complaint cured, and allowed the patient to discontinue wearing the truss, but cautioned him to avoid those circumstances which would tend to reproduce the disease.

Case II. *Slight Varicocele cured by pressure in seven months.*—A young man, aged twenty-four, a medical assistant, in rather impaired health, applied to me in July, 1843, on account of a varicocele on the left side. It came after an injury, accompanied with strain, which occurred to him in the February preceding. The spermatic veins were not enlarged to any great extent, but they were distinctly varicose, and he experienced considerable uneasiness in the cord, especially after standing for some hours in his business. He had worn a suspender, which gave him only partial relief. The

left testicle was rather smaller than the right. His countenance had an anxious expression, and he was uneasy in his mind about his case. His bowels were costive. I prescribed an aperient pill and some tonic medicine, and directed the truss to be applied; and, as usual, recommended him to avoid fatigue and straining efforts. I saw nothing more of this patient till nearly a month after his first visit, when he called and said that he was much relieved, and to a greater extent than he could have expected in so short a period. On examining him with the truss on, I found the spermatic veins less dilated than when I first saw him. He said the truss fretted his skin at first, but this had been remedied by interposing some wash-leather between the pad and skin. He was able to continue in his business, standing or moving about nearly all day. His countenance had lost the anxious expression, and his general health was improved. This patient visited me again February 3, 1844. He had been in the country, and had returned in improved health. He felt quite well, but still wore the truss. I could detect no enlargement of the spermatic veins, and considered the varicocoele cured, though, as a precaution, I recommended him to continue wearing the truss for a few months longer.

Case III. *Double Varicocoele cured by pressure in ten months.*—A gentleman, aged twenty-four, of spare form, pale countenance, and subject to indigestion since infancy, consulted me in May, 1844, on account of a double varicocoele. There was evident enlargement of the spermatic veins on the left side, and a very slight dilatation of these veins on the right. He had been troubled with the complaint about a twelvemonth. He had worn a suspender for many months, but the swelling and inconvenience were increasing. I noticed a dilated condition of the superficial veins throughout the body, the veins of the penis, thighs, and legs being especially large and prominent. He was of a costive habit. On the 22d instant, I directed a double truss to be applied. I also recommended the legs to be bandaged with stocking-web rollers, a cold bath to be taken daily, the bowels to be kept open by an injection of cold water in the morning, and I also prescribed the citrate of quinine and iron.—July 23d. He had steadily worn the truss since I last saw him, during which period he had been travelling on the continent. His health and digestion were improved. The spermatic veins on the left side were diminished, and all uneasiness was

removed. No enlargement of the veins was observed on the right side.—March 6th, 1845. There was no appearance of varicocele, nor uneasiness on either side. I considered the complaint cured, but recommended the patient to continue the use of the truss for six months longer.

Case IV. *Varicocele cured by pressure in fifteen months.*—A gentleman, aged twenty-seven, consulted the late Mr. Key for a rapidly increasing varicocele, and was recommended to have recourse to pressure on the spermatic veins by means of a truss. He wore it for two months, and clearly derived benefit, when he quitted this country for Canada. He left off the truss after wearing it for fifteen months. On his return to England, at the expiration of three years, he was seen by Mr. Daldy, of Broad Street Buildings, who had previously attended him. Mr. Daldy found the varicocele quite cured.

To these examples of cure by pressure I could add several other cases, if necessary, to establish the value and utility of this plan of treatment. In those related, the dilatation of the veins had taken place at a comparatively early period of life, was not excessive, nor in two of them of long duration, but was productive of more or less inconvenience and uneasiness, which could be only partially or scarcely at all remedied by the suspender. They were precisely the cases, in which it was to be expected, that pressure, by relieving the veins of the superincumbent weight of the blood, would enable their coats to recover their proper size and tone.

The same method of treatment has been applied to several other cases of severe varicocele, in which a complete restoration of the veins was scarcely to be expected, but in which the lever truss speedily and fully relieved the painful symptoms of the complaint, and enabled the patient to follow active occupations without inconvenience, as in the following instance.

Case V. *Large painful Varicocele on the right side entirely relieved by pressure.*—A middle-aged professional gentleman had been subject to varicocele on the right side for twenty years. A large plexus of dilated veins surrounded the body of the testicle and extended up to the inguinal canal. It caused considerable uneasiness, a disagreeable sense of dragging and weight from the loins, and sickness after much exertion. The right testicle was not smaller than the left, but felt somewhat softer. The complaint

was attended with considerable depression of spirits. No benefit was obtained from the use of the suspender. I saw this patient with Dr. Thomson, of Dalkeith, in 1848, and recommended the application of the lever truss. The instrument gave instant relief, and no tumor appeared in the scrotum on his rising from the recumbent posture. It did not, however, prevent the veins becoming swollen when violent exercise was taken on horseback; and as considerable discomfort arose when the bandage was tightened so as to increase the pressure, Dr. Thomson was led to suggest an alteration in the construction of the instrument, which fully answered the purpose intended. Violent exercise was taken without the occurrence of any distension of the veins, and the patient was entirely relieved from the distressing symptoms of the disease. A less amount of pressure was after a time found sufficient. In a note which I received from the patient in 1854, he states, that for four months he has been able to dispense with the use of the truss, finding a suspender amply sufficient to prevent any dilatation of the veins or uneasiness, and that he was more equal to physical exertion than he had been for years. I saw this gentleman in the summer of 1855. He was leading a most active life without inconvenience, and was wearing only the suspender.

I have met with very few cases in which a greater amount of pressure from the lever truss than could be borne without discomfort, was required in order to relieve the distended veins. In this last case, the varicocele was of long duration and of remarkable size, and the patient led a very active life, so that unusual force was necessary. The instrument contrived by Dr. Thomson was a combination of the ordinary spring and lever truss. It had, therefore, both a circular and lever spring with a pad so attached as to admit of slight elongation. In some cases of large varicocele, an instrument of this kind might be more efficient, and be worn with greater comfort than the simple lever truss; for when much pressure is exerted with the latter, the tightness of the thigh-strap cannot be borne without uneasiness. Dr. Thomson has used his truss, also, in cases of varicocele coupled with reducible inguinal hernia with advantage.¹ Varicocele and inguinal hernia is, however, by no means a common complication, and the circumstance, that in no case of hernia in which a truss has been worn, have I observed

¹ Vide Dr. Thomson on Varicocele treated by Compression, *Monthly Journal of Medical Science*, Nov. 1848.

any marked dilatation of the spermatic veins, is worthy of note in reference to the beneficial influence of pressure in varicocele.

I have already remarked, that persons afflicted with varicocele often labor under a degree of mental distress very much out of proportion to the actual disease. By appropriate general treatment and encouraging advice, combined with local means, these hypochondriacal symptoms may generally be removed. In other instances, the uneasiness in the testicle and spermatic cord, and even in the loins, is so great as to produce much real suffering, and to prevent the person affected from making any kind of exertion. In the following case, which was an instance of the kind, the patient was prepared to submit to an operation, had I recommended one, but the benefit derived from the truss was sufficient to render so severe an alternative unnecessary. In this case, the distension of the veins was so slight, that the relief obtained was, I believe, mainly due to the pressure made on the spermatic nerves.

Case VI. *Distressing Varicocele relieved by pressure.*—In March, 1845, I saw, in consultation with Mr. Pye Smith, a gentleman, aged twenty-five, who was affected with a distressing varicocele on the left side. He was single, and of delicate appearance, but his general health was represented to be pretty good. He had been troubled with the complaint for about four years; but, notwithstanding the use of a suspender, the uneasiness had continued to increase, and at length had become so severe, that he was unable to attend to his business, or even to walk a short distance without lying down afterwards. On his entering my room, he begged to be allowed to place himself on the sofa, in order to procure relief, and he afterwards remained in the recumbent position for half an hour before leaving the house. On examination I found the dilatation of the spermatic veins on the left side by no means considerable. The testicle was of proper size, but the seat of a good deal of morbid sensibility. On making tolerably firm pressure on the spermatic veins at the external abdominal ring with the fingers, and continuing it whilst the patient walked backwards and forwards in the room, no uneasiness whatever was experienced, whereas the pain returned in a few minutes after the pressure was remitted. The application of the lever truss was consequently recommended. This gentleman called on me again at the end of two months, and stated that he had derived great relief from constantly wearing the truss, and was able to take exercise and to attend to business, though he still suffered from the

complaint at times, especially after fatigue. Mr. Smith has recently informed me that our patient continues free from uneasiness. He wore the truss for about three years, and then discontinued it, and now uses only a suspender.

In general, too little attention is paid to constitutional treatment in varicocele, which is commonly regarded as exclusively a local disease. In many of the cases in which pressure gives marked relief, the subjects of the disease are persons between eighteen and thirty years of age, of weak frame and constitution, whose venous system and circulation are feeble, as is evinced by the large size of the superficial veins, particularly in the lower extremities, paleness of the countenance, and cold hands and feet. Not unfrequently they are affected also with spermatorrhœa. In these cases, the operation of local remedies may be aided materially by general treatment, such as quinine and steel medicines, cod-liver oil, a nutritious diet, sea-bathing, and similar measures calculated to improve the tone of the system, as well as to check the frequent involuntary emissions.

In estimating the value of the treatment by pressure in effecting a cure of varicocele, it must not be overlooked that, although the veins may have recovered their proper size and tone, a return of the complaint would in most cases be readily induced by the causes ordinarily producing distension of the spermatic veins, and that unless the patient avoided these causes, such as constipated bowels, straining efforts, and prolonged fatigue, he may be disappointed in deriving permanent benefit from the treatment. For this reason I advise the continued use of the truss for some time after all symptoms of the affection are removed, as a matter of security, more especially in persons who are obliged to lead an active life, or who have naturally a feeble constitution or impaired health.

There are very few cases of varicocele occurring in early life in which the common suspender is sufficient to prevent the increase of the complaint and the suffering attending it. In the cases which I have related, the painful symptoms of the disease could not be remedied by this mode of supporting the parts, and the patients were consequently anxious for further assistance. There is, however, another class of cases in which the application of pressure is capable of giving considerable relief, though not of curing the disease. They are cases met with at a somewhat advanced period of life, in which the varicocele is considerably developed, the plexus

of dilated veins, though of gradual formation, being of large size and long standing, but not productive of greater inconvenience than a sense of weight and aching after fatigue, and when the part is deprived of support. The uneasiness in these cases may generally be remedied by the use of a suspender, but this seldom succeeds in preventing the progressive increase of the varicocele, which occasions a gradual wasting of the testicle, and sometimes assumes a painful character. The application of pressure, however, not only removes the slight uneasiness which exists when the veins are pendent, but also counteracts the tendency to further dilatation, though the enlargement is too great to admit of the vessels being reduced to their former size.

From these observations it will appear, that I consider the treatment by pressure to be applicable either for the cure or relief of the majority of cases of varicocele occurring in practice. Certainly, in all those cases in which tolerably firm pressure with the fingers, at the abdominal ring, removes the sense of weight and uneasiness along the cord, this plan may be resorted to with every prospect of a beneficial result; and its simplicity, freedom from all risk, and efficiency, render it preferable to all operative modes of treatment. The truss should be applied whilst the patient is recumbent, so as to make rather firm pressure at the external ring. It sometimes happens that the truss, though worn with comfort after being adjusted in the morning, begins to produce uneasiness towards the after part of the day. When this is the case, the pressure should be diminished by loosening the thigh-strap. In general, the truss need be worn only during the day, though in some instances I have thought it advisable to recommend its use during the night also. Thus, in one case, the patient suffered uneasiness in lying on the side affected, and was able to pass a better night on wearing the truss. When the scrotum is unusually pendulous or when the veins are very long and form a plexus of any size, I advise the addition of the silk net suspender, which may be readily adapted to the truss.

CHAPTER II.

ADIPOSE TUMORS OF THE SPERMATIC CORD.

THE spermatic cord is sometimes the seat of abnormal depositions of fat. The adipose matter is formed in the loose connective

tissue, and is often interposed between the structure composing the cord. It occurs at different parts, as high up as the inguinal canal, and as low down as the epididymis. In examining the testicles of a young man who died of pleurisy in the London Hospital, I found a quantity of fat along the cord and around the epididymis, and some also beneath the tunica vaginalis reflexa on the posterior part of the testicle. In another case I met with some small isolated masses of fat, coupled with a small encysted hydrocele of the cord. When developed in considerable abundance, this deposit sometimes forms, in front of the spermatic vessels, a loose and movable tumor, having the soft doughy feel and lobular character, of ordinary adipose swellings. In general, these accumulations of fat occasion no inconvenience, and consequently do not require any surgical treatment. They have, however, been mistaken for omental hernia.

Fig. 50.



Pelletan, by whom they have been noticed, speaks of them under the denomination of "*hernie graisseuse*."¹ I once dissected a lobulated fatty tumor, surrounded by the thickened sheath of the spermatic cord, on the body of a man upwards of eighty years of age, which was very similar in appearance to a portion of omentum contained in a hernial sac. It is represented in the annexed woodcut. Cloquet has also given an account of the dissection of a fatty tumor, found in the left spermatic cord of an old man, which resembled an irreducible epiplocele.² Mr. Macilwain mentions an instance in which it was thought proper to cut down upon a tumor of this kind in the spermatic cord to ascertain its nature, in consequence of the patient laboring under the symptoms of strangulated hernia. The surgeon finding the fatty tumor to be so intimately connected with the cord as not to admit of extirpation without injury to it, removed tumor, testicle and all³—a proceeding which, in such a case, could scarcely have been justifiable. These swellings have the soft inelastic feel, clongated form,

¹ Clinique Chirurgicale, t. iii, p. 33.

² Recherches sur les Causes et l'Anatomie des Hernies Abdominales, p. 26.

³ Surgical Observations, p. 291, note.

and indolent character of an irreducible omental hernia. In a case, therefore, where obstinate constipation and other symptoms of strangulated hernia exist, if after a careful examination of the tumor, and an attentive consideration of the history of the case, any question remain respecting its nature, it would be quite right to remove all doubt by cutting down upon the part. A mass of fat in the cord may form, however, a defined and distinct swelling. Such a tumor is preserved in the Museum of the College of Surgeons (No. 2461). It is imbedded about an inch above the testicle, in the tissues of the spermatic cord, and loosely connected with them. Its shape is oval; it measures four inches in length, and consists of numerous lobes of soft fat, closely held together by thin partitions of fibro-connective tissue.

A remarkable case of large fatty tumor in the scrotum originating in the spermatic cord, was seen by several eminent surgeons a few years ago, the greatest difficulty having been experienced in distinguishing the nature of the swelling.—J. M., aged forty-three, a gentleman of a spare habit, became conscious, in the autumn of 1842, of an enlargement in the left side of the scrotum. Mr. Hale Thompson, who first saw him, supposed the swelling to be hernial, but subsequently changed his opinion and considered the disease to be confined to the spermatic cord. The tumor continuing to enlarge, the patient was seen by Mr. Lawrence, who viewed the swelling as hernial, and having made attempts at reduction without effect, pronounced the case to be irreducible omental hernia. Mr. Thompson not being satisfied with this conclusion took the patient to Sir B. Brodie, who, after a careful examination, decided against the swelling being a hernia, without expressing an opinion of the nature of the case, which he considered was very obscure. Mr. M. afterwards left England, and spent eight months in Italy. Whilst in Florence he consulted Mr. Harding, formerly assistant-surgeon to the Westminster Hospital, who declined giving an opinion of the case. On the gentleman's return from the continent, in August, 1843, the tumor was found to be very little enlarged. In the course of the succeeding six months, however, it went on increasing. At this period Mr. Edwards, surgeon, of Chelsea, accompanied Mr. M. to my house. I found on the left side of the scrotum a tumor about the size of a large orange, of rounded form, feeling soft and inelastic, and indistinctly defined above, where it was connected with a thickened

spermatic cord. The testicle was distinct from the tumor, and situated at its lower part towards the inner side. The tumor remained constant under pressure and in all positions, and was quite opaque. The patient stated that when he rose in the morning the swelling began to swell and to feel heavy and uneasy, and that it became tense and painful before an evacuation, but afterwards resumed its former state. Although unable to explain at this time the connection which appeared to exist between the bowels and the tumor, I had no hesitation after a careful examination in declaring that it was not hernial, but probably an adventitious formation in the scrotum; and I recommended the continuance of the iodine treatment, and also sanctioned the use of a truss, which had been applied by Mr. Edwards's direction to the groin, and which gave relief from the uneasy sensation in the bowels without increasing the size of the swelling. During the following twelvemonth the tumor went on enlarging until it acquired the average size of a melon. It preserved its pyriform shape, had a doughy feel, and the testicle was situated in front. Mr. M. was then examined by Sir B. Brodie, Mr. Travers, and Mr. Lawrence, who, in consultation, decided against the tumor being connected with the testicle, or being hernial, and though unable to determine its nature, recommended its removal, which had become urgently necessary from its great bulk and rapid growth. The operation was performed by Mr. Lawrence, assisted by Mr. Travers, in April, 1845. After an exploratory incision, which revealed the structure of the morbid growth, an attempt was made to save the testicle, but the different parts of the cord were so mixed up with the tumor that after some loss of time the entire contents of the left scrotal sac were excised. The tumor was found to measure eight inches in length by six in width, and to be composed of adipose tissue partially lobulated, which had its origin in the spermatic cord high up, but as it increased in size had made its way downwards into the scrotum, a direction in which there was the least resistance. The patient recovered favorably. A tumor about the size of a large chestnut subsequently formed in the left groin, and was excised by me in 1849. It was a small lobulated fatty tumor developed from the remains of the spermatic cord within the inguinal canal, and was probably a portion of the original tumor, which having been left in the first operation had since grown in size.¹

¹ The early history of this case is taken from Mr. Edwards's report published in the

The patient has since consulted me on account of another growth in the upper part of the same side of the scrotum. It had been forming for about six months, and was slowly increasing. On Nov. 29, 1855, this gentleman submitted to the knife a third time, and I excised, upwards of ten years after the first operation, two small adipose tumors, one the size of a large chestnut, the other about half its size. The larger tumor extended from the contracted scrotum to the inner part of the thigh. It was situated a good deal lower down than the fatty growth removed in the second operation.

The persistent tendency to the formation of fatty growths in the spermatic cord and scrotum gives additional interest to this case. Pathologists have described recurrent growths of different kinds, but I am not aware of a recurrent adipose tumor having been noticed. The patient is a very lean person and is subject to pains in the loins and lithic acid deposits.

The sympathy which existed between the bowels and the tumor in this puzzling case, may be explained by reference to what I have observed in varicocele. Any cause obstructing the return of blood by the enlarged spermatic veins would tend to produce tension and uneasiness in the tumor. Such an obstruction occurred, from hydrostatic pressure, when the patient assumed an upright posture, and also from an accumulation of fæces in the sigmoid flexure previous to an evacuation, the tension and uneasiness being always relieved after an action of the bowels. That this is the right explanation of the symptoms, which added so much to the obscurity of the diagnosis, is confirmed by the decided relief which was derived from a truss making pressure at the abdominal ring, so as to relieve the swollen veins of the pressure of the column of blood.

Serous and sanguineous effusions into the tissues of the cord, and cysts containing serum or blood developed in this part, have already been treated of under the respective heads of Hydrocele and Hæmatocele of the Spermatic Cord.

Provincial Medical and Surgical Journal, June 25, 1845. The case has also been briefly described by Sir B. Brodie in his Lectures on Pathology and Surgery, p. 271; and by Mr. Lawrence in a Clinical Lecture in the Medical Gazette, vol. xxxvi, p. 177.

CHAPTER III.

SPASM OF THE CREMASTER MUSCLE CAUSING RETRACTION
OF THE TESTICLE.

SPASM of the cremaster muscle is an occasional symptom in affections of the urinary organs. It occurs in diseases of the kidney and in the passage of a calculus down the ureter, and also in affections of the prostatic portion of the urethra, being the result of irritation transmitted from these parts. In the first two cases, it may be explained by the connection which exists between the spermatic plexus of nerves and the renal, and in the latter one by the connection of the same nerves with the hypogastric plexus along the vasa deferentia. The spasm comes on suddenly; so that the testicles are forcibly drawn up and retained, whilst it lasts, at the external abdominal rings, the patient suffering more or less pain. This affection is to be treated with the warm bath, fomentations of hops or poppy heads, opiates, &c., attention being at the same time paid to the source of irritation. In the following case spasm of the cremaster muscle, of a mild character, appeared to be the result of an injury.—A Jew boy, aged eleven, applied to me at the hospital, on account of an uneasy state of the testicles. They were retracted to the external abdominal rings, producing a deep wrinkle across the pubes. The scrotum was flaccid and empty. It appeared that a short time before he had received a kick on the pubes, since which the testicles had become drawn up. Pressure on the pubes gave pain, and when made at the part where the cremaster is attached the testicle immediately descended, but was again elevated as soon as the pressure was remitted.¹ Conceiving that the spasm was chiefly owing to slight inflammation at the seat of injury, which had affected the internal attachment of the cremaster, I ordered leeches to the part, fomentations, and mild aperients. No relief followed this treatment. The cold douche was then applied, with the effect of causing the muscle immediately to relax. The spasm returned soon afterwards, but not to the same extent as before. The douche

¹ I once observed the same circumstance in a case of spasmodic retraction of the testicles, symptomatic of irritation at the prostatic part of the urethra.

was repeated with the same effect, and the boy ceased to attend. He came to me again, some months afterwards, with gonorrhœa and a return of the spasm in the cremaster, which subsided as the disease in the urethra became relieved.

In the spring of 1853, I was consulted in the following case of retraction of the testicles in a child five years and a half old. He was brought to me from the north of England, in consequence of the medical attendant suspecting the existence of an imperfect transition of the glands, and of the anxiety of the parents, who imagined that a serious imperfection had been overlooked after birth. The boy was of feeble frame and constitution. The scrotum was moderately developed, but flaccid and empty. The testicles were lodged in the groins close to the abdominal rings, and the integuments below were slightly wrinkled. The nurse observed this state of the parts on coming to her situation a year before, but omitted to mention it, and the parents were not aware until recently of anything being wrong. By gentle manipulation I could press the glands down into the scrotum, but they were displaced immediately the traction was remitted. From this occurrence, and the developed condition of the scrotum, and from the circumstance of the former medical attendants and nurses not having noticed any imperfection, I came to the conclusion that the abnormal position of the testicles was the result of permanent spasm of the cremaster occurring some time after birth, but at a period which could not be ascertained. I recommended cold bathing and tonics, and directed the nurse to use gentle manipulation daily in order to press the glands down. The little boy was brought to me after four months' residence at the sea-side, much improved in health. The testicles descended occasionally into the scrotum, though not constantly. On suddenly exposing the parts I found them *in situ*, but they were instantly drawn up into the groins, which the nurse stated was their usual position. The manipulation was directed to be continued. I saw the boy again in the summer of 1854, on his return from the sea-side. He was in improved health, and the testicles were in their natural situation, and according to the nurse's report remained so pretty constantly. I have met with two similar cases, in which the affection was also mistaken for an imperfect transition of the glands. But the presence of a properly formed scrotum, and the facility with which the testicles were pressed into it, rendered the diagnosis easy.

DISEASES OF THE SCROTUM.

CHAPTER I.

INJURIES OF THE SCROTUM.

THE scrotum is exposed to contusion and laceration from external violence. Contused wounds of the scrotum are chiefly remarkable on account of the large quantity of blood liable to be effused

Fig. 51.



beneath the skin. The connective tissue is exceedingly loose, so that a slight blow produces rupture of vessels and abundant ecchymosis. The swelling which arises is considerable: the testicles become surrounded with so much blood that they cannot be felt, and the skin in a few days assumes a deep purple hue. These cases generally do well; but some weeks elapse before the blood is all absorbed, and the swelling and discoloration are completely removed. All that is usually necessary in the way of treatment, provided the testicles

have escaped injury, is rest, support to the swollen scrotum with a bandage or pillow, and the application of a cold evaporating lotion. A lotion composed of the hydrochlorate of ammonia, or a poultice of oatmeal and vinegar, appears to accelerate the absorption of the effused blood. When the contusion is severe and the extravasation considerable, inflammation sometimes arises, and even terminates in suppuration or mortification; but this is a rare result of such injuries. It is most liable to occur in persons of impaired

constitution. In a case of the kind, after gangrene or suppuration has taken place, the scrotum should be relieved by free incisions. They must not, however, be resorted to for the relief merely of extravasation of blood.

Lacerations of the scrotum, though formidable in appearance, usually terminate favorably. There is not much hemorrhage; but, owing to the contractile nature of the integuments, the scrotum presents a large gaping wound, and the testicles protrude. The injured parts must be cleansed, the coagula removed, the testicles repressed, and the edges of the wound brought together and retained by sutures and adhesive plaster. Water-dressing should be applied, and the oiled silk will guard the wound from urine. The patient must keep at rest in bed. The wound heals in general very readily.—I was sent for to see a man who, in a state of intoxication, had sustained an injury of the privates by sitting down upon the broken arm of a chair. I found a large triangular lacerated wound on the left side of the scrotum, the edges of which were so far separated that the part appeared as if a great portion of the integuments had been removed, the whole of the left testicle and part of the spermatic cord being completely exposed and projecting. The edges of the wound were without difficulty immediately closed with sutures: they united by the first intention, and in a week the part had completely united, and the patient was cured.

The scrotum is not very often injured by burns or scalds, the part being protected by a woollen dress.—A deaf and dumb man, at work at a soap-boiler's, fell into a vat containing caustic potass of the strength of 10 per cent. He was admitted into the London Hospital shortly after the accident. The skin was denuded of cuticle, and superficial sloughs were produced on the face and hands; but his chief sufferings arose from the action of the caustic on the prepuce and scrotum, which were entirely excoriated, and a good deal of the skin destroyed. The sloughs separated, and the sores healed in about three weeks, the scrotum being slightly contracted.

CHAPTER II.

PRURIGO SCROTI.

THE scrotum is sometimes the seat of an intolerable itching, which produces much distress, tormenting the patient by day and disturbing his rest at night, and thus whilst it lasts rendering his life truly miserable. This complaint is commonly accompanied with the formation of a number of round flattened papulæ of a slight red color, which are readily recognized on the dull and darker surface of the scrotum. The skin becomes excoriated by the patient scratching himself; which, though productive of temporary relief, aggravates his sufferings afterwards. There is often a disagreeable discharge from the sebaceous follicles; and after the complaint has existed for some time the skin becomes browner than in its natural state, and somewhat thickened. The irritation comes on in paroxysms: it is increased by exercise, especially in warm weather, and by the heat of the bed at night; and it is liable to extend towards the anus and down the inside of the thighs.

This affection attacks adults; but occurs generally to persons in advanced life, and is supposed to be induced by inattention to cleanliness. It is a very obstinate complaint, sometimes resisting every kind of treatment for months, and even years, though liable to complete remissions and frequent relapses at variable intervals.

Treatment.—Very little relief is afforded in this affection by internal remedies. Attention should be paid to the state of the bowels and of the secretions; and if the general health should suffer from want of rest, morphia may be taken at bedtime. The patient should be enjoined to refrain from scratching the parts; his dress should be light and loose; and he ought strictly to avoid hot condiments and a stimulating diet. The parts should be washed daily with soap and water, and a warm bath might be taken two or three times a week. A lotion of vinegar and water, or of the bichloride of mercury, in the proportion of two grains to the ounce of water will often allay the irritation. The yellow wash, and lotions composed of the carbonate of potass in the proportion of four drachms to twelve ounces of rose-water, have also proved of service. But

the lotion which I have found most effectual is one composed of a drachm of the sulphuret of potash dissolved in eight ounces of lime-water. I have found, too, the *Unguentum Hydrargyri Nitratis Dil.*, smeared over the scrotum at night, one of the most efficacious applications for diminishing the itching. Sulphur ointment and sulphureous vapor baths sometimes succeed in affording relief. Local cinnabar fumigations, applied by means of an apparatus adapted for the purpose, have been strongly recommended by M. Bielt in this troublesome and distressing complaint.¹

CHAPTER III.

VARICOSE VEINS OF THE SCROTUM.

SOME authors have noticed, amongst the diseases incidental to the scrotum, a varicose condition of its veins. The veins, however, of this part are never weakened and dilated to a degree sufficient to require the attention of the surgeon. The remarkable contractility of the dartos contributes to their support, and to diminish the tendency to dilatation. Varix of the spermatic veins commences much more commonly in young men than in old; whereas, in consequence of the lax state of the scrotum in advanced life, the scrotal veins more frequently become varicose at that period. In old men they sometimes present a curious appearance, the scrotum being studded with a number of minute red or black spots, about the size of a pin's head, and sometimes larger, evidently dilations of the small veins, as they disappear for a time under gentle pressure of the finger. I have occasionally observed them when the scrotum has been distended by a hydrocele, and also in varicocele. In severe cases of the latter affection, the veins of the scrotum frequently partake in the dilatation of the vessels of the spermatic cord.

¹ Cazenave et Schedel, *Abrégé pratique des Maladies de la Peau*, édit. 2ème. p. 315.

CHAPTER IV.

PNEUMATOCELE OF THE SCROTUM

SIGNIFIES a distended state of this part from the presence of air in its loose connective tissue, which is treated of by old writers on surgery as an affection of no uncommon occurrence. Emphysema of the scrotum, however, is only seen in the present day when produced by artificial inflation; a trick of feigning disease sometimes practised by soldiers and others. The scrotum has been inflated to the size of a child's head; a degree of distension which is borne without any injurious consequences. The nature of the tumor can be readily detected by the crepitation of the part under the finger.

CHAPTER V.

ŒDEMA OF THE SCROTUM.

THE connective tissue of the scrotum being loose, abundant, and free from fat, and the skin plentiful and very extensible, this part undergoes a more remarkable degree of distension from œdema than any other part of the body; and, owing to the pendent position of the scrotum, œdema of this part is often met with, occurring generally as a symptom of organic disease, in conjunction with serous infiltration of the extremities or body at large. Œdema of the scrotum, termed by some writers *anasarcous hydrocele*, occasionally occurs, however, as a distinct affection, or independently of œdema in other parts.

Symptoms.—The œdema commences at the most depending part of the scrotum, to which it is confined when the infiltration is slight. When the whole scrotum is involved, the part presents a uniform, indistinctly defined tumor, with a soft and doughy feel, and pits on pressure; but, owing to the large size of the spaces, the fluid traverses the connective tissue so freely that the parts retain the impression of the finger for but a few moments. As the tumefaction increases the tegumental rugæ are obliterated, and the surface

of the skin becomes smooth and somewhat tense, and has a pale, glistening, semi-transparent appearance. The testicles are so surrounded with the infiltrated serum that they cannot be distinguished. When the œdema is considerable, the integuments of the penis generally participate in the distension: the prepuce becomes twisted and distorted, and so enlarged as to conceal the glans penis. The tumefaction often extends also to the groins and lower part of the abdomen.

Œdema of the scrotum is occasioned by the various causes obstructing the circulation and producing dropsical effusion in other parts; and, owing to the depending position of the scrotum, it is usually one of the parts first distended in general dropsy. It is observed occasionally as a local affection in old men, and in persons debilitated by disease, especially where the scrotum is particularly pendent. It is sometimes seen in children shortly after birth, and is produced by disease of the inguinal glands, and by tumors obstructing the course of the veins and lymphatics. In hydrocele, œdema is produced by acupuncture, and occasionally also by an accidental rupture of the sac.

Diagnosis.—The symptoms presented by œdema of the scrotum are of so marked a character, that this affection is not readily confounded with any other disease, and when the dropsy is general it is scarcely possible that any error can be committed. Local œdema may, however, be mistaken for a hydrocele. In œdema the tumefaction is soft and diffuse, pits on pressure, occupies both sides of the scrotum, and conceals both testicles: in hydrocele it is resisting, defined, and fluctuating, and confined to one side; except in double hydrocele, in which case there is no similitude to œdema, as there are always two well-defined and distinct tumors on the two sides of the scrotum. Pott once operated on an œdematous swelling of one side of the scrotum, having mistaken the case for a hydrocele.—A man, aged forty-five, showed him a swelling on the left side of the scrotum, which was large, full, tight, and had all the symptoms of a hydrocele; viz., fluctuation, freedom of the upper part of the process, and concealment of the testicle. Thinking himself clear in the true nature of the disease, he without scruple pierced it with a small trocar in the lower and anterior part, and let out about two ounces of limpid water, but could not draw off any more. He withdrew the canula, and examined the swelling again, which was but

little diminished though altered in appearance. He could then plainly distinguish the testicle, and became convinced that the disease was (what he had never seen before) an anasarca of the scrotum on one side only, having a certain quantity of water in one cyst or bag, and the rest diffused through the cells in the usual manner; the latter made all the tumefaction, which remained after tapping; and the former had concealed the testicle.¹ If this case had been narrated by a surgeon of less judgment and experience than Mr. Pott, we should be inclined to suspect that the tumor had originally been a hydrocele, and that, when tapped, the fluid had partially escaped into and infiltrated the connective tissue around the sac. The limitation of the œdematous swelling to one side of the scrotum was a very unusual occurrence; for although the connective tissue is usually somewhat condensed in the course of the septum, there is always a ready and free communication between the two sides. In this case the septum must have been particularly close and dense, and the cause of the dropsical effusion have operated only on one side.

Treatment.—Œdema of the scrotum being in general only a symptom of disease elsewhere, and not of itself of any serious moment, seldom requires any separate or local treatment. When the tumefaction is very great, and the skin so tense that there is risk of its bursting or mortifying, the part must then be relieved by acupuncture. The spaces so freely communicate with each other, that one or two punctures with a darning or cataract needle are sufficient to relieve the most bulky swellings. It was usual formerly to relieve the distended scrotum by incisions. But this is a dangerous practice; for incisions are very likely to excite diffuse inflammation, which, in the weak state of the part and of the patient's powers, is speedily followed by mortification. Pott has recorded three cases in which extensive mortification followed incisions of the scrotum for this complaint, one of which proved fatal.²

¹ *Chirurgical Works*, 4to. p. 336.

² *Lib. cit.*, Case VI, p. 365.

CHAPTER VI.

DIFFUSE INFLAMMATION OF THE SCROTUM.

DIFFUSE inflammation of the scrotum, though not particularly noticed by writers on surgery,¹ often occurs as a distinct affection; and, owing to modifications in the texture of the integuments, the character of the disease differs in some respects from that of diffuse inflammation in other parts. This affection is well known to practitioners of experience, and is not unfrequently seen in hospital practice. It occurs under two forms. In one, it is mild and unattended with danger, and terminates favorably under gentle antiphlogistic treatment. In the other form, the complaint is severe and dangerous, and prompt and decisive measures are requisite to avert serious consequences. The first form occurs generally to persons at the adult period of life. The skin of the scrotum becomes affected with slight erythema; assumes a faint rosy hue; soon becomes shining, tense, and œdematous; and quickly loses its rugous character. The light inflammatory blush extends in a short time to the perineum and integuments of the penis, which also become tumid and œdematous; and in some instances it spreads even to the groins, lower part of the abdomen, and inside of the thighs. Its appearance is accompanied with symptoms of slight fever, a hot skin, and furred tongue. This affection usually occurs to persons exhausted by fatigue and want of rest and nutriment.—A lad, twenty years of age, previously in tolerable health, who had walked up to London from a long distance in the country for work, and had fared badly on the road, applied to me on account of this affection, with which he was seized the day after his arrival in the metropolis.—A laboring man who had been exposed to the inclemency of the weather, and had undergone a good deal of fatigue on board a barge in the river, was attacked in the same manner. I have seen it in weakly persons arise from slighter circumstances, and sometimes without any obvious cause. It is occasionally produced, especially in old people, by the irritation of the urine drib-

¹ Some cases of this affection have been published by Mr. Liston, under the denomination of "Acute Anasarca of the Scrotum," in the twenty-second volume of the Transactions of the Medico-Chirurgical Society.

bling over the parts, and the lodgement of discharges and acrimonious fluids amongst the rugæ of the scrotum.

The second form of diffuse inflammation of the scrotum commences like the former; but the disease runs rapidly into mortification. The slight rosy hue of the scrotum soon becomes changed to a violet or livid color, and ash-colored or tawny spots appear at an early period on the most depending parts. These quickly extend, and, unless checked by decisive treatment, the whole scrotum soon becomes involved; so that if the patient survive, and the sloughs separate, the testicles are entirely denuded of their integuments. The sloughing is attended with symptoms of a low typhoid character, a hot skin, feeble pulse, and a brown and dry tongue, under which the patient often sinks. This form of the affection attacks persons of a cachectic habit and broken-down constitution, or men enfeebled by age. It is produced by the same causes as the milder form; but it is also liable to occur after a slight injury, and is often excited by disease of the urinary organs, as stricture, or an abscess in the perineum, independently of urinary extravasation.

It is a remarkable circumstance, that inflammation of the scrotum rarely terminates in the effusion of lymph or pus. It seems that the pressure consequent upon the abundant effusion of serum is sufficient to arrest the circulation, and occasion mortification before other changes ensue. When suppuration takes place it is generally in the diffused form, though the matter has a tendency to collect at the most depending part of the scrotum. I have rarely met with a well-formed abscess in this part unconnected with suppuration in the perineum or with disease of the urethra.

Diagnosis.—Diffuse inflammation of the scrotum may be confounded with œdema; but differs from it in the more active character of the disease, in the inflammatory redness of the skin, and the general febrile disturbance which accompanies it. A urinary abscess deeply seated in the perineum is often attended with inflammatory œdema of the scrotum. The pain occasioned by firm pressure in the perineum, the swelling observed in that region, and the existence of urinary symptoms, would prevent the case from being mistaken for one simply of diffuse inflammation.

Treatment.—In the milder form of this affection gentle purgatives, antimonials to determine to the skin, and rest in the recumbent position for a few days, with the application of an evaporating

lotion to the scrotum, which should be well elevated on a pillow placed between the thighs, are generally all that is required to subdue the inflammatory action, and cause the swelling to subside. When there is much tension, warm fomentations are preferable to cold applications. It is bad practice to apply leeches in these cases, as they are very liable to induce sloughing. If gangrene be apprehended, punctures with a lancet should be made in the scrotum at its most depending part, to allow the serum to escape, and thereby remove the tension. Nothing succeeds so speedily and effectually in averting the sloughing process as early incisions. They must not be merely skin-deep, but the distended connective tissue beneath should also be divided. They need not, however, be very extensive, as one or two small openings well placed will be sufficient for the relief of the tension. It is of great moment to avoid the loss of blood: consequently, if bleeding ensue from any of the divided vessels, it should be restrained by pressure. The parts are to be treated after they have been incised, with fomentations, water-dressings, or light poultices. In this dangerous form of the disease the powers require to be supported by quinine, ammonia, wine and brandy, and a nourishing diet. The diffuse inflammation which occurs in connection with stricture or perineal abscess usually subsides as soon as the obstruction is overcome, the matter discharged, and the exciting cause removed.

In persons of feeble constitution, a chronic thickening and œdematous state of the integuments is liable to remain after the inflammatory symptoms have subsided. This must be treated with steel medicines, quinine, a generous diet, and support in a suspender. I attended a tall gentleman of a lymphatic temperament with an attack of this complaint in the mild form, but several weeks elapsed after the inflammation had subsided before the integuments of the penis and scrotum recovered their healthy state and proper size.

CHAPTER VII.

MORTIFICATION OF THE SCROTUM.

MORTIFICATION of the scrotum is commonly the result either of the worst form of diffuse inflammation just described, or of urinary

extravasation, and it sometimes occurs at the close of exhausting fevers. It would be out of place to treat here of the subject of urinary effusion. It will be sufficient to remark that the effect of the irritating fluid diffused throughout, and distending the connective tissue of the scrotum, is soon to excite inflammation and produce the death of all the parts with which it comes in contact, unless such a result be speedily averted by deep and pretty free incisions, so as completely to relieve the distension and allow the urine to drain off from every part of the scrotum.

The scrotum is so situated, protected by and receiving the warmth of the thighs, and at no great distance from the centre of the circulation, and at the same time is so well supplied with bloodvessels, that it is a part by no means exposed to mortification from deprivation of animal heat. Amongst the numerous cases of frost-bites which have come under my notice, I have only witnessed one in which the scrotum had suffered from this cause. The spots were very small, and after the separation of the superficial sloughs the sores soon healed. Sir A. Cooper has recorded the case of a soldier, who, in the retreat with the Duke of York's army in the Netherlands, was exposed to excessively severe cold. His scrotum became frost-bitten, and sloughed away.

Treatment.—Sloughing of the scrotum, from whatever cause it may proceed, is seldom free from danger, being attended with a failure of the powers of life and low febrile symptoms, which require to be counteracted by stimulants. The local treatment, after free incisions have been made, consists in the application of fomentations and light poultices, which may be moistened with the *Liquor Calcis Chlorinatæ*. In many cases, the extension of gangrene can be arrested and the powers rallied by judicious treatment; and then the process of separation and detachment of the dead parts soon commences, and proceeds with activity. Large sloughs come away, leaving behind an extensive, open, and formidable-looking sore, with the testicles and spermatic cords completely denuded. Fortunately, there is no part of the body in which the reparative efforts of nature are more remarkably displayed after extensive mortification than in the scrotum. In cases in which the whole scrotum and even part of the integuments of the penis have sloughed away, granulations have rapidly sprung up from the exterior of the tunica vaginalis and investments of the cords; cicatrization has advanced from

the surrounding skin; and partly by liberal demands upon the integuments of the pubes, groins, and perineum, and partly by the production of new skin, the exposed testicles and spermatic cords have become invested with a new covering adequate for their protection. The new scrotum is not exactly like its predecessor; it is thin, tense, and without color, and closely invests the testicles; and sometimes, when there is much contraction of the cicatrix, the glands are forced upwards into the groins. In these cases the surgeon can do but little to aid and promote the efforts of nature. He has only to apply mild and simple dressings, and to avoid unnecessary meddling.

CHAPTER VIII.

ELEPHANTIASIS OF THE SCROTUM.

ELEPHANTIASIS is a disease of the scrotum occasioning a remarkable tumor; it is rarely seen in Europe, but is of very common occurrence in many other parts of the globe. It consists in a morbid thickening or hypertrophy of the tissues of which the scrotum is composed. The epidermis becomes thickened, rough as in ichthyosis, and intersected with fissures or chaps. The chorion is immensely consolidated, and often nearly an inch in thickness, very dense, and tough. The chief bulk, however, of the tumor is formed by the conversion of the loose connective tissue of the scrotum into a large mass of fibro-connective tissue, infiltrated with a thick jelly-like albuminous fluid. The areolæ of this tissue vary a good deal in size; some of them have been found large enough to admit the extremity of the little finger. These cells, when condensed by inflammation, form hardened masses in the substance of the tumor, which has a lardaceous appearance when cut, or resembles cartilage; and they sometimes undergo calcareous degeneration. In some cases lobes of fat tissue intermingle with the fibrous tissue. The testicles are buried in the morbid mass towards its posterior part, but they are usually sound in structure. Occasionally there is a quantity of serum in the tunica vaginalis. In the tumor figured at p. 395, and also in a case operated on in Calcutta, there was a hydrocele on both sides imbedded in the diseased parts.

In the latter instance the larger hydrocele contained between five and six pints of fluid.¹ The spermatic cords are elongated several inches, owing to the testicle being dragged downwards during the growth of the tumor, but they are not otherwise diseased. In a remarkable case operated on in Guy's Hospital, the cremaster muscles were nearly as thick as the finger.² The morbid growth is lowly organized. Its arteries are chiefly derived from the external pudic and perineal vessels; but these, owing to the magnitude of the tumor, become of great size. The veins are numerous, large, varicose, and very tortuous.

Elephantiasis chiefly affects the inhabitants of the warmer regions of the earth. It appears to be endemic in many parts of Asia and Africa, and is a very common disease in the East Indies, Syria, and Arabia, and also in Egypt. A moist, relaxing, as well as a hot climate, seems favorable to the development of this disease. Thus, according to Dr. Esdaile,³ it is in a great measure confined to Bengal and the seaboard of India, being rarely met with in Upper India; and in Egypt it is also principally confined to the Delta of the Nile, and is seldom seen above Cairo. Elephantiasis was formerly considered peculiar to Barbadoes; but it now prevails in the other West India Islands, and likewise on the continent of America. Negroes are very subject to it. It is not, however, confined to the natives of warm climates, though they more frequently suffer from its attacks than European residents. Very few cases of this disease have occurred in Europe. Sir W. Blizard presented to the College of Surgeons a good specimen of a scrotum and prepuce affected with this disease in its early stage, which appears to have been removed after death. M. Charles Delacroix, formerly minister for foreign affairs in France, suffered from this affection of the scrotum for fourteen years. The tumor, which weighed thirty-two pounds, was removed by operation, and he afterwards recovered.⁴ Mr. Liston excised at Edinburgh a large tumor of this kind, which weighed upwards of forty-five pounds, from a young man aged twenty-two. It had commenced when he was only ten years of age, and had gone on increasing gradually from that time.⁵ Delpech operated on a patient aged thirty-five, a native of Perpignan

¹ Calcutta Quarterly Journal, No. 3.

² Medical Gazette, vol. viii, p. 95.

³ Ibid. vol. xvi, p. 449.

⁴ Delonnes, Operation de Sarcocoele.

⁵ Edinb. Medical and Surgical Journal, vol. xix, p. 566. This tumor is now deposited in the Museum of the College of Surgeons in London.

in the South of France, whose scrotum was converted into a large mass weighing sixty French pounds.¹

Elephantiasis of the scrotum is a morbid affection of the integuments, analogous to the enlargement of the extremities commonly known by the name of *Barbadoes leg*; with which, indeed, in those countries where the disease is prevalent, it is liable to be combined. Elephantiasis of the scrotum, however, grows to a greater size and makes more rapid progress than the same disease in the leg, owing to the very loose texture and depending state of the parts. The labia pudendi of females, especially in warm climates, are subject to a similar change, though not to the same extent nor so frequently as the scrotum. I recently removed a large tumor of the kind, involving the right labium and part of the left, from a woman twenty-five years of age. It owed its origin to a hurt at the age of eleven, but the tumor had grown rapidly during a recent pregnancy.

Elephantiasis of the scrotum appears to originate in a low form of inflammation of the integuments, probably of the nature of the mild diffuse inflammation, which in warm climates persists or recurs, and leads to organic changes in structure. I know little, however, of the disease from personal observations, for only one case has come under my notice.—In 1847, I saw with Mr. Haynes Walton, a gentleman, aged twenty-eight, a native of Barbadoes, recently married, and enjoying tolerable health, who had been in this country about four months. The whole scrotum was considerably enlarged, forming a doughy, inelastic swelling, slightly indented or fissured in two or three places. The skin was liable to an erythematous redness, attended with an itchy sensation. Its sensibility was very little impaired. The testicles were at the upper part of the scrotum and healthy, with the exception of slight enlargement and induration of the left, the result of an operation for the radical cure of a hydrocele performed some years previously. A portion of skin at the root of the penis was a little red and puffy, evidently affected slightly with the disease. There was a diffused swelling in the left groin, and the upper femoral glands were enlarged. The right groin was unaffected. The patient first observed an enlargement of the scrotum about two years and a half previously, and he thought that it had increased rather than diminished since he had

¹ Chirurg. Clinique de Montpellier, t. ii, p. 5.

been in England. This was a genuine case of elephantiasis in the early stage of the disease.

Symptoms.—Authors describe elephantiasis as commencing with rigors, followed by fever, pain, and heat in the part affected, and swelling and tenderness of the neighboring lymphatic glands, the scrotum remaining swollen after these symptoms subside. Similar attacks of fever and inflammation occur more or less frequently, and at various intervals, the tumefaction being increased after each attack. Dr. Titley states¹ that on each accession of fever there takes place an effusion of lymph into the cellular membrane, and that the part affected remains swollen for a longer period after each attack. After several returns, the quantity of lymph effused being greater than can be absorbed, the limb or part becomes permanently enlarged. The skin, as the disease advances, becomes rough and rugged. Patients will live for many years, carrying about with them an enormous leg or scrotum, and will enjoy excellent health, except during the occasional attacks of fever. When the scrotum is the part affected, after a certain time the tumor increases, independently of the febrile attacks. Where the penis is also affected, these parts enlarge together in an equal ratio; but if the scrotum only be affected, then the penis, as the scrotum enlarges, becomes drawn in, so as ultimately to disappear, and become completely imbedded in the tumor; the prepuce being distended elongates, and opens by a navel-like aperture on some part of the anterior surface (see Fig. 53), or even at the very end of the tumor.

When the disease is fully established, the enlargement increases gradually and constantly for many years, until at length the swelling reaches an enormous magnitude. As this takes place, the skin is borrowed from the lower part of the abdomen, so that the hair on the pubes becomes thinly scattered on the front and upper part of the tumor, which at the same time encroaches on the perineum behind. The tumor, which is of an oval or pyramidal form, the apex being superior, thus becomes attached to the body by a thick peduncle, which extends from the pubes, occupies the whole of the perineum, and terminates posteriorly at the verge of the anus. The surface of the swelling is sometimes equal and smooth; more generally it is rough, rugous, and tuberculated, and covered in various parts with brownish scales. It is often ulcerated in dif-

¹ Dr. Titley on Diseases of the Genitals of the Male.

ferent places, the sores being covered with scabs, or discharging a sanious matter. The tumor feels firm and solid; and sometimes, when handled, communicates an indistinct sense of fluctuation. In some instances it pits on pressure, but the density and thickness of the skin usually prevent the part from receiving the impression of the finger. Its growth is unattended with pain; the part is by no means tender, and bears rough handling, and even being pricked and scratched without the patient suffering uneasiness, owing to the skin having lost its natural sensibility. The chief inconvenience which it produces arises from its great bulk and weight; occasioning deformity, impeding and in many instances entirely putting a

Fig. 52.



stop to the patient's movements, and interfering with micturition and the performance of the genital functions. The accompanying woodcut is taken from a photograph of a man who was in the

Military Hospital at Alexandria under the care of Mr. Farquhar. The tumor reached halfway down the legs, and almost entirely prevented the patient from walking. It measured at its greatest diameter three feet eight inches. It was excised, and weighed seventy pounds after the fluid of the hydroceles had drained from it.¹

Elephantiasis is sometimes complicated with scrotal hernia; and

Fig. 53.



often, as has already been observed, with hydrocele. There is scarcely any limit to the size which the tumor may attain. It has been known to acquire such a magnitude as to weigh more than two hundred pounds,² exceeding the weight of the rest of the body. Baron Larrey met with a case in Egypt in which the tumor was estimated to weigh fifty kilograms, or a hundred pounds; and he also states that he saw, in different parts of the same country, ten or twelve more cases of the kind nearly as large. It has been found to measure more than four feet in circumference, and almost to reach the ground when the patient is in the

upright position. In the case operated on by Clot-Bey, the morbid mass, which weighed one hundred and ten pounds, kept the patient's legs far apart, and obliged him to remain constantly on the ground; it was so bulky that he could even sit upon it. In the above figure, of a black man affected with elephantiasis, taken from Dr. Titley's work, the tumor descended nearly to the ankles.

All surgeons who have had much experience of this disease agree that it is entirely local, and tends but little to impair the general

¹ The case is described in the *London Medical Gazette*, vol. xlv, p. 192.

² Case cited from "*Ephémérides d'Allemagne*," by Larrey, *Mémoires de Chirurgie Militaire*, t. ii, p. 115.

health and shorten the duration of life. The tumor, however, when of great size, is liable to mortify. Dr. Hendy, of Barbadoes, has related the case of a black man who had a scrotal swelling, which measured six feet in circumference, and twenty-four inches in length. A mortification of the part terminated the miserable existence of this poor creature.¹ Dr. Hendy states that five other cases had

Fig. 54.



come within his knowledge, where the scrotum, being much enlarged, had sloughed, leaving the testicles denuded.

¹ A Vindication of the Facts and Opinions contained in a Treatise on the Glandular Disease of Barbadoes, p. 117.

[The preceding plate gives the appearance of a negro suffering from *Elephantiasis Scroti*, and the same individual two months after its extirpation by Dr. Picton of New Orleans. The operation was performed on the 3d of October, 1837, in the presence of twenty physicians and surgeons of New Orleans. The disease had existed ten years, and the weight of the tumor was fifty-three pounds. The preparation is in the Anatomical Museum of the University of Pennsylvania.]

Diagnosis.—The symptoms of this disease are so remarkable, that it can scarcely be confounded with any other affection. Oedematous thickening of the scrotum, consequent upon chronic diffuse inflammation, is the only disease which bears any resemblance to it. The rough and indurated state of the skin, the firm and solid nature of the tumor, and its large size, are characters quite sufficient to mark the true nature of elephantiasis.

Treatment.—Elephantiasis, when advanced so as to produce considerable enlargement of the scrotum, is an incurable disease. Various local applications and internal remedies have been tried, but there is no satisfactory account of beneficial effects having resulted. The surgeon rarely meets with this disease at a sufficiently early period to afford a fair hope of his being able, by remedies, either to obtain its removal or even to arrest its progress. At its first commencement it should be treated with mild antiphlogistic remedies, the scrotum being well supported, and the patient kept in the recumbent position. Iodine is a remedy which seems to be very applicable to this disease; but I am not aware that it has yet been fairly tried in the early stage. Free scarifications and firm compression long continued have been found of decided service in reducing elephantiasis of the leg. Pressure, however, cannot be applied with equal effect to the scrotum, owing to the want of some resisting point.

When the enlargement of the scrotum has reached such a magnitude as to occasion serious inconvenience and render the patient's life miserable, there is no other remedy but its removal by the knife. I have already noticed cases in which considerable tumors of the scrotum have been successfully removed by Delonnes, Liston, and Delpech. Tumors even of a much larger size have also been excised, and the patients have afterwards recovered. Dr. Titley successfully removed from a young man, a negro, a tumor weighing

seventy pounds, which is represented in the engraving at p. 396. Dr. Esdaile removed from a Hindoo, aged twenty-seven, in Calcutta, a mass which weighed one hundred and three pounds, and was as heavy as the man's whole body. He recovered from the operation. Clot-Bey excised one weighing one hundred and ten pounds.¹ There is nothing in the situation, structure, or relations of the tumor offering any objection to its removal. Its situation is external to the important cavities; integuments are the parts affected; and the only organs in any way involved are the testicles and penis. But owing to the great extent of the parts divided, and the size of the vessels supplying a morbid mass of the magnitude which many of these tumors acquire, the operation becomes a very formidable and dangerous affair; and patients have died from hemorrhage during or immediately after its performance. In Mr. Liston's operation the flow of blood was compared by those present to the discharge of water from a shower-bath, it was so instantaneous and abundant. Before half the vessels could be tied the patient sunk off the table, without pulse, and with relaxed muscles. He was only saved by being freely plied with strong whiskey. The late Mr. Key removed, in Guy's Hospital, from Hoo Loo, a native of China, aged thirty-two, who came over to this country on purpose to undergo the operation, a tumor of the scrotum which weighed fifty-six pounds eight ounces; but the patient died a few minutes after its termination from loss of blood.² A tumor weighing fifty-six pounds was excised by Dr. Goodeve, of Calcutta; but the patient, a man forty-five years of age, lost between thirty and forty ounces of blood, and gradually sank, and died in about six hours after the operation. Dr. Titley has also recorded a remarkable case in which a mass weighing one hundred and sixty-five pounds, and measuring two feet five inches in length and five feet ten inches in circumference, was removed from a slave at St. Christopher by Mr. Wilks, a surgeon. The operation occupied nearly eight hours; a copious venous hemorrhage followed each stroke of the knife, and the man died, apparently from exhaustion, towards its conclusion.

Before undertaking the removal of a large tumor produced by this disease, it is important to determine whether the penis and testicles can be preserved. In the operation expedition is of the

¹ Histoire d'une Tumeur Elephantiaque du Scrotum.

² Medical Gazette, vol. viii, p. 93.

greatest moment; and the patient's safety might be compromised by a tedious dissection in order to preserve those parts. Surgeons have commenced with the intention of leaving them; but, in consequence of the alarming loss of blood, the attempt has been abandoned in the course of the operation. This was the case in Mr. Liston's operation, and likewise in Mr. Key's; the patient's powers, in the latter, having become so depressed, that Sir A. Cooper, who was present, proposed that no further attempts should be made to save the penis and testicles, which were accordingly excised. Clot-Bey and Dr. Titley succeeded in saving the penis, but they were obliged to remove the testicles. Dr. Esdaile, who has had considerable experience at Calcutta, having performed no less than one hundred and sixty-one operations, states, that he never attempts to preserve the testicles when the tumor is above fifty pounds (unless the man is strong and robust); but the penis, with one exception, has been always saved, however large the mass. Delpech succeeded, after a tedious and difficult dissection, in saving these parts in his operation, and the patient recovered. The tumor weighed sixty pounds. The elongation of the spermatic cords, and the difficulty of finding healthy integuments to cover the testicles, are further reasons for not making the attempt to preserve them when the elephantiasis is of great magnitude.

When no attempt is made to save the testicles the operation is of a simple nature. The penis is to be first dissected out from the front of the tumor, and then its peduncle is to be divided near its attachment to the body by rapid strokes made with an amputating knife, including in one sweep the spermatic cords, which latter should be immediately seized with the fingers by assistants to prevent their retracting. If any part of the integuments be sufficiently sound to form a flap to cover the large open wound, the surgeon must take advantage of it, and modify the operation accordingly. When the intention is to preserve the genital organs, three flaps of appropriate size must be formed; one in front to cover the penis, and two others, one on each side, to be brought together in order to invest the testicles in the manner practised by Delpech. In cases complicated with hernia the sac is usually adherent to the diseased tissues around, and requires to be detached with caution, which tends to delay and increase the difficulties of the operation. Active assistants must be ready with their fingers to close the

mouths of the bleeding vessels. Firm pressure on the cut surface by means of a large sponge, expertly applied so as to follow the surgeon's knife, will be found a good way of arresting the bleeding until the surgeon is ready to secure the vessels. Stimulants and the transfusing instruments should be at hand in case of need. It is a good plan to elevate the tumor above the level of the body for some minutes before the operation is commenced, in order to empty it as much as possible of its blood. I should also be inclined, before making the incisions, to pass a strong double ligature or cord through the upper part of the mass by means of a long straight needle, and to constrict the base of the tumor temporarily by tying the ends on each side. This would have the effect of closing some of the great vessels, and of checking hemorrhage especially from the large veins. After the bleeding vessels had been secured separately these temporary ligatures could be removed. It appears that patients who recover from the first effects of the operation generally do well, and that the large wound heals readily. In the large number of one hundred and sixty-one operations performed by Dr. Esdaile, the mortality was only five per cent.

It is open to question, whether chloroform should be administered to patients during the excision of these immense tumors. Dr. Esdaile, who is a staunch advocate of mesmerism, and who performed most of his operations on Hindoos in this condition, strongly condemns the use of chloroform, and he mentions two fatal cases, one which occurred at Alexandria, and the other at Madras, in which the patients died from the operation performed under its influence. However carefully and expeditiously the operation may be executed, it is impossible to prevent a large loss of blood; but from my experience of the effects of chloroform in other operations attended with hemorrhage, I much question whether the danger incurred in the removal of a large elephantiasis is increased by its action. In one of the fatal cases referred to by Dr. Esdaile, the man represented in Fig. 52, and operated on at Alexandria, there can be little doubt that the patient died from the shock and loss of blood, and not from chloroform, for he survived the excision of the tumor four hours.

CHAPTER IX.

ADIPOSE TUMORS OF THE SCROTUM.

FORMATIONS of fat in the scrotum have been known from the time of Galen by the term "Steatocele." Morgagni states that he has sometimes seen fat accumulated in the scrotum to a considerable extent.¹ I am indebted to Mr. Kiernan for a section of a large scrotal tumor entirely composed of large lobules of adipose tissue. Unfortunately he was unable to supply me with any history of the case. There can be no doubt that in several of these tumors of the scrotum, the fat was originally deposited in the spermatic cord, and, in some instances, descended from its upper part in the groin. I have described at p. 375 a case of large fatty tumor, in which this was the case. Indeed, a fatty tumor which has grown from the first in the connective tissue of the scrotum is an exceedingly rare lesion. Mr. Henry Gray recently showed me an adipose tumor which was undoubtedly developed in the connective tissue of both sides of the scrotum. The patient from whom it was taken died of phthisis and disease of the right knee, but as the tumor was not detected until after death, no history of it could be obtained. Mr. Gray, in describing this tumor, states,² "Although the body generally was very much emaciated and pale, the subcutaneous areolar tissue over the whole of the front of the abdomen contained a considerable amount of fat. The same tissue, at the lower part of the abdomen, where it became continuous with the superficial cellular tissue and dartos of the scrotum, instead of changing its character, also contained a very large amount of fat. This was continued down into the scrotum on both sides, in the form of elongated round or oval-shaped lobules of very large size, towards the lower and most depending part of the scrotum; but becoming smaller, more flattened, and compact as the tumor pressed forwards or backwards towards the abdominal or perineal regions respectively. These masses of fat were placed immediately behind the skin of the scrotum, and in front of the spermatic cords and testes

¹ Cook's Morgagni, vol. ii, p. 435.

² Transactions of Pathological Society of London, vol. vi, p. 230.

of both sides, forming two distinctly separate masses of an elongated oval-shaped form, with an uneven lobulated surface; the combined mass weighing half a pound."

Mr. Jabez Hogg and Mr. H. Thompson¹ have also described a similar growth of adipose matter in the subcutaneous connective tissue of the penis, as well as of the upper part of the scrotum. The tissues of the latter were considerably hypertrophied. These parts were removed from the body of a man aged sixty-five.

The diagnosis of adipose tumors occurring in the scrotum, whether originally formed there, or in the spermatic cord, is extremely obscure. I have already described the great difficulties experienced in making out the nature of a large fatty tumor which had sprung originally from the upper part of the cord. In Mr. Gray's case no clear decision as to what was the nature of the growth could be arrived at previous to the dissection of the part; and in Mr. Hogg's case, although the patient had suffered for nearly four years, it seems, that the character of the swelling was never ascertained during life.

CHAPTER X.

FIBROUS TUMORS OF THE SCROTUM.

TUMORS of a fibrous nature occur in the connective tissue of the scrotum. Mr. Fergusson informed me of one, about the size of a walnut, which he excised from a man, aged seventy-three, in King's College Hospital. It lay in close contact with the tunica vaginalis on one side, and care was required in order to avoid opening that membrane. Some years ago a middle-aged gentleman consulted me on account of a small fibrous tumor at the back of the scrotum. Mr. Hilton removed a fibrous tumor, nearly the size of two fists, from the scrotum of a man aged thirty. It adhered so firmly to the tunica vaginalis that a portion of the membrane had to be excised with it.²

These tumors form round or oval masses, arranged, when of large size, in lobes, and they are enclosed in a capsule of fibro-con-

¹ Ibid. p. 232.

² Medical Times and Gazette, vol. vii, p. 679.

nective tissue. The smaller growths are composed of a close-set fibrous tissue, which is sometimes dense and compact like the fibrous tumor in the uterus. The larger tumors consist also of dense fibrous tissue mixed with a large amount of a loose pliant fibro-connective tissue infiltrated with more or less serous fluid. The elongated filaments characteristic of fibre tissue are readily recognized in the microscope. Fat-cells are sometimes interspersed with the delicate filaments; and in the more dense tumors, masses of cartilage and calcareous matter have been found imbedded.

Fibrous tumors are of slow formation, but show a constant tendency to increase. They occur about the middle period of life, but the larger growths have been observed chiefly in persons advanced in age. Tumors of a similar character are developed in other parts where loose connective tissue abounds. Some years ago I excised one from the labium of a female, aged forty-five.

Fibrous tumors of the scrotum sometimes attain an immense size. One, a section of which is preserved in the Museum of the College of Surgeons, weighed twenty-three pounds, and measured twenty-three and a half inches in circumference. It was taken after death from a man, aged seventy-five. Mr. Paget has described two cases which came under his notice at St. Bartholomew's Hospital. In a man, aged seventy-four, the tumor was found after death to weigh twenty-four pounds. In another man, seventy years old, the tumor was of great size, and caused sloughing and hemorrhage, from which the patient sank.¹ M. Lesauvages has noticed the case of a man, aged seventy, who had a scrotal fibrous tumor which weighed forty-four pounds, and was of so great a size, that as the patient sat with it resting on his thighs, it reached beyond his knees and up to the sternum.²

Diagnosis.—A small fibrous growth, especially if attached to the tunica vaginalis, might be mistaken for an encysted hydrocele of the testicle, but the distinction is easily made by attention to the firmness of the swelling and the absence of transparency. A fibrous tumor of great size might be regarded at first sight as an elephantiasis, but the nature of the case would be easily recognized by the circumstance of the skin being sound and movable over the growth.

Treatment.—The only mode of dealing with these tumors is to

¹ Lectures on Surgical Pathology, vol. ii, p. 112.

² Archives Générales de Médecine, 4e série, t. ix, p. 212.

excise them, and as they are of an innocent nature, there is no liability to a return of the disease. The operation should be performed at an early period. When first developed, the tumor is but loosely attached in the scrotum, but it soon gets connected to the coverings of the testicle, and on attaining a large size cannot be removed separately from this gland. Dr. Mott, of the United States, excised an enormous fibrous mass from the scrotum of a man about seventy-three years of age. The scrotum was twelve to fifteen times its ordinary bulk, and was filled with tumors of a stony hardness, from the size of nutmegs to that of a large pea. The tumors had all a very white appearance; and the integuments over two or three of the largest, having been ulcerated for upwards of a year, poured forth a fetid discharge. A white substance, resembling mortar, was discharged from these openings. The disease was upwards of twenty years' duration, and had been gradually increasing, the tumors multiplying as the scrotum augmented in size. The whole of the disease was removed, and the patient recovered from the operation, and at the end of three years afterwards he was enjoying excellent health.¹ Mr. O'Ferrall removed a large tumor of a similar kind from the scrotum of a man forty-four years of age, in St. Vincent's Hospital, Dublin. Repeated bleeding from an ulcer on the surface was exhausting his strength. He recovered from the operation, but died some months afterwards of phthisis. From the account given of the tumor, it seems probable that it was originally developed in the spermatic cord.²

CHAPTER XI.

CYSTIC TUMOR OF THE SCROTUM.

TUMORS composed chiefly of cysts are liable to occur in the scrotum, but are very rare. They are of the nature of the proliferous cysts described by pathologists. Growths of a similar character have been observed in the labium, cheek, and other parts

¹ Philadelphia Journal, as quoted in the London Medical and Physical Journal, vol. lviii, p. 516.

² Dublin Quarterly Journal, vol. i, p. 521, and Paget's Lectures, vol. ii, p. 113.

involving the integuments. These tumors are not malignant, and if wholly excised are not liable to reappear. I am indebted to Mr. Crompton, surgeon, of Birmingham, for kindly furnishing me with the particulars of an interesting case of this disease.—T. A., when about eight years of age, was observed to have two or three small cysts in the scrotum. They were of the size of a horse-bean, and situated beneath the integuments. In the course of a few months they increased considerably in size, and fresh cysts appeared. There were, perhaps, as many as twenty or thirty; some of the size of a pea, others as large as a kidney-bean. They caused no pain or inconvenience. Mr. Francis Elkington, who had charge of the patient, having used friction with iodine and mercurial ointments without effect, punctured the cysts several times with a grooved needle, and afterwards applied pressure with adhesive plaster, but without any advantage. The fluid evacuated was invariably transparent and serous. After the disease had existed four or five years, Mr. Elkington took the lad to London to see Sir A. Cooper, who recommended graduated pressure, which was applied for two years, but without benefit. The patient was afterwards lost sight of until he came under the care of Mr. Crompton

Fig. 55.

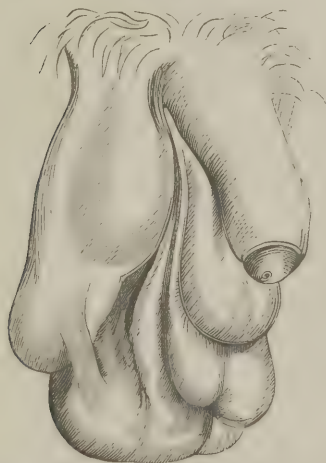
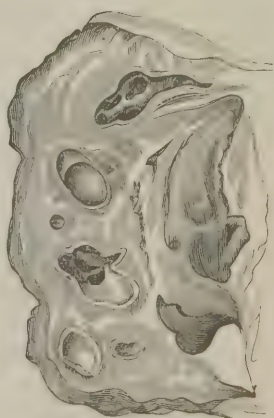


Fig. 56.



at the General Hospital, Birmingham, in 1849. He was then about twenty-two years of age. The testicles felt healthy. Below them, in the substance as it were of the scrotum, a number of

elastic globular bodies could be felt, and behind, a hardened and inflamed portion of the integument, which was tender on pressure, and the chief source of his annoyance. The disease appeared to involve the septum, and to spread from thence towards the crura of the penis. The condition of the scrotum is represented in Fig. 55. Mr. Crompton excised the whole of the diseased mass. The wound healed by granulation, and the man afterwards went to India as a soldier. The part removed resembled the cystic sarcoma of the breast. The cysts were of various sizes, and contained transparent fluid. Fig. 56 is taken from a drawing of the tumor sent me by Mr. Crompton.

CHAPTER XII.

CARCINOMA OF THE SCROTUM.

CANCER very rarely attacks the scrotum except in the comparatively mild form of the epithelial. Mr. Harvey Ludlow describes in his Prize Essay, the case of a shoemaker, aged fifty-three, who was under Mr. Stanley's care in St. Bartholomew's Hospital on account of a large open cancerous ulcer on the scrotum. The growth, together with the right testicle and some diseased inguinal glands, were removed. The patient died of phlebitis a fortnight after the operation. Mr. Paget examined the cancer-substance under the microscope, and found no epithelial cells, but bodies similar to those exhibited by scirrhus of the mamma.

SECTION I.

MELANOTIC CANCER OF THE SCROTUM.

When we consider the proneness of black cancer to affect primarily the skin, and the deep color of the scrotum, it is somewhat remarkable that this part is most rarely the seat of melanosis. The only case of it, with which I am acquainted, is the following one, which occurred in my own practice.—Mr. G., a cabinet-maker, aged thirty-two, and enjoying tolerable health, consulted me in November, 1842, on account of a fungous growth on the scrotum. The tumor was

about the size of a small walnut, and of a dark color, had an irregular granular surface, and was attached to the left side of the scrotum by a narrow peduncle or neck. About an inch on one side of this tumor I observed a small dark spot, apparently produced by some black deposit beneath the epidermis, raising it a little above the surrounding surface. The patient stated that the fungous growth was first noticed about three months before, when it resembled the little speck just described, which had only been observed a fortnight. It had increased rapidly of late, but gave no pain. The shirt was discolored by a slight discharge and bloody marks. There was no enlargement of the glands in the groins. I excised the tumor and small speck near it. On making a section of the morbid growth, the fungus appeared to spring from the cutis. Its base was hard, and evidently of a scirrhus character; but the projecting part was soft, and easily broken down. Small irregular spots of melanic pigment were observed on the cut surface, as well as on the exterior of the tumor, and the little speck seemed to consist of a similar matter deposited immediately beneath the epidermis.¹ The wound healed favorably. In May, 1843, I saw Mr. G. in consequence of a return of the disease. I observed three black specks on the scrotum in the vicinity of the cicatrix, and the glands in the left groin were slightly enlarged and indurated. In March, 1844, the disease was found to have made considerable progress. There was a firm indurated mass about the size of an almond in the scrotum implicating the cicatrix, and an enlargement of the inguinal glands forming a tumor the size of an orange, and a smaller swelling the size of a hen's egg just below it. He suffered a good deal of pain, and his general health was slightly impaired. After this, I saw no more of my patient for more than four years, when, in October, 1848, I was requested to visit him, and found him in bed in great pain from the tumor in the groin, which had grown to the size of a very large cocoa-nut. The hard mass in the scrotum had increased very little. It appeared that he had continued at his occupation until about three months back, when, after his making some unusual exertion, the tumor became more painful, rapidly enlarged, and in a few weeks doubled its previous size. Up to this period he had enjoyed tolerable health, and had latterly gained

¹ The tumor is preserved in the London Hospital Medical College.

flesh ; but since the attack of pain and change in the tumor, he had become thinner and weaker, and been confined to his bed. On the 7th of the December following he died of repeated hemorrhage from an ulcer in the rectum. The induration in the scrotum was found to consist of carcinomatous matter slightly tinged with black pigment. The inguinal tumor was a mass of encephaloid cancer. The lumbar glands were slightly enlarged, and quite black. The organs of the chest and abdomen were all sound.

It must be noticed, as contrary to the usual course of melanotic cancer, that the disease having reappeared at its original seat, and also in the groin, so early as six months after the operation, subsequently advanced so slowly that after lasting six years, the only internal parts affected with it were the lumbar glands, and those only in a very slight degree.

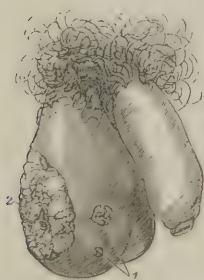
SECTION II.

EPITHELIAL CANCER OF THE SCROTUM.

Epithelial cancer of the scrotum, or as it is commonly called, *chimney-sweeper's cancer*, is a disease of the skin which attacks the scrotum of persons who have been exposed to the contact of soot. It is generally developed in the form of a small pimple, or warty excrescence, termed *soot-wart*, which often remains on the scrotum for months, or even years, without undergoing any change. Usually there is only a single wart at the lower part of the scrotum ; sometimes there are two or three of different sizes ; and occasionally they are so numerous and so abundantly and largely developed, as to form a considerable cauliflower excrescence. After a time the wart becomes soft, excoriated, and red, and exudes a thin irritating discharge ; which, becoming dry, forms an incrustation over the excrescence. After the scab has been picked or rubbed off by friction against the dress, ulceration ensues, destroys the wart, and produces a painful chronic sore, characterized by an indurated base, with elevated and sometimes nodular or overhanging edges, and an irregularly excavated surface discharging a thin sanious fluid of an offensive odor. The ulcer, if suffered to proceed, increases widely, invading the whole scrotum to the perineum, and laying bare the

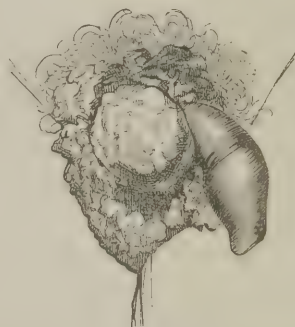
crura penis. At the same time it penetrates deeply to the tunica vaginalis, which becomes firmly connected to the morbid scrotum, and adherent to the testicle. This organ is said also to be liable to become involved in the disease, and to form the seat of a deep excavated sore, but no case in which the cancer has reached the testicle has fallen under my notice. The glands in the groin often

Fig. 57.



1. Small soot-warts.
2. Cancerous ulcers succeeding the wart.—From a preparation in the London Hospital Museum.

Fig. 58.



Aggravated case of Chimney-sweeper's Cancer.

enlarge at an early period from irritation ; but at length become indurated and diseased. After a time they soften, suppurate, and form large and deep ulcers in the groin, similar in character to the sore on the scrotum. The ulcer spreads towards its circumference widely and superficially, whilst in the centre it burrows deeply, until in many instances it reaches the great vessels of the thigh, destroys their coats, and causes death by hemorrhage. In other cases the inguinal glands remain unaffected ; but ulceration continues to proceed slowly in the direction of the cord, and a frightful sore is produced, its progress being attended with severe darting pains. The patient's sufferings are protracted for many months, and sometimes for years ; he becomes gradually cachectic ; loses appetite and flesh ; his countenance assumes a peculiar leaden or waxy hue and anxious expression ; and he ultimately sinks, worn out by his sufferings and the effects of the disease on his constitution.

The small excrescence in which cancer scroti usually originates

is soft, vascular, and sensitive, and in many respects similar to the soft warts which occur on the internal membrane of the prepuce, and on the glans penis. The soot-wart appears, in fact, to consist of a congeries of morbidly enlarged papillæ. The Museum of the London Hospital contains a remarkable specimen of chimney-sweeper's cancer, in which nearly the whole scrotum is occupied by a cauliflower excrescence, which exhibits these papillæ in a very advanced state of development. It was removed by Mr. Headington from an old man about sixty-four years of age, who afterwards left the hospital cured. Both testicles were exposed in the operation. The morbid growth is composed of a number of projecting processes densely grouped together, of variable size, but many very large, with their summits lobulated, expanded, and elevated on narrow peduncles more or less flattened. They are represented in Fig. 59. The warty processes closely resemble the elevated growths abundantly developed about the cancerous ulcer, produced by soot on the back of a hand and wrist, preserved in the Museum at

Fig. 59.



St. Bartholomew's Hospital.¹ The soot-wart is sometimes covered with a dense and thick concretion, formed by successive layers of incrustation, the superficial still remaining attached, so as to form a projecting elongated conical process, which is not unlike the spur of the cock. A specimen of cancer scroti, with a horn-like growth three-quarters of an inch in length, which I removed from a chimney-sweeper, is preserved in the Museum of the College of Surgeons (No. 2469). The process when very long is occasionally twisted like the horn of a ram. Some curious excrescences of this kind are

¹ The case is related at p. 413. The hand is figured in Paget's Pathology, vol. ii, p. 417.

represented in the clever etchings of Mr. Wadd.¹ The adjoining figure (No. 60), taken from one of them, exhibits the process of its exact size.

The appearances presented by this disease closely resemble those

Fig. 60.



of carcinoma of the lower lip, and its minute structure corresponds with epithelial cancer, of which it forms a well-marked example. The base of the ulcer is composed of a grayish substance, which is firmer and harder than the adjoining cutis, and consists of epithelial cancer-cells. The border of this, the true cancerous substance, is not well defined. It mingles with the adjoining tissues, which it gradually invades, spreading at the borders, whilst ulceration is going on in the central and superficial

parts. The warty growth, as well as the sore, is infiltrated with epithelial cancer-cells. The disease is originally quite superficial. Mr. N. Ward, however, excised from the scrotum of a chimney-sweep, in the London Hospital, a subcutaneous tumor, the size of a hazel-nut, which was wholly composed of epithelial cancer-tissue, the skin covering it being quite sound, though adherent to the growth. This is the only instance of a subcutaneous chimney-sweeper's cancer with which I am acquainted. It was probably developed in one of the follicles of the part. The enlarged and indurated lymphatic glands are composed of an opaque yellowish-white substance, mixed up, when softening occurs, with a soft curd-like matter or grayish pus, and broken-up whitish particles enclosed in a cyst, the capsule of the gland. The cancerous elements are the same in the inguinal glands as in the scrotum.

¹ Cases of Diseased Prepuce and Scrotum, Pl. x, xi, xii.

Carcinoma scroti is, with few exceptions, confined to chimney-sweepers; and the irritating action of the soot on the skin of the scrotum is no doubt its exciting cause. A similar disease occasionally occurs in other parts of the skin, but the scrotum being seldom cleansed and well adapted to harbor soot, seems more exposed to the disease. Sir James Earle has related the case of a man who had a large sore resembling chimney-sweeper's cancer, which reached from the bend of the wrist to the knuckles, occupying almost the whole of the back of the left hand. The man was a gardener, and for several springs had been in the habit of strewing soot on the ground round the young plants to preserve them from slugs. He carried the soot in an old garden-pot which hung on his left hand, while he strewed the soot with his right.

Other irritating substances may excite this disease. Dr. Paris states that the smelters are occasionally affected with a cancerous disease in the scrotum similar to that which affects chimney-sweepers.¹ Dr. Warren, of the United States, remarks that he has met with a few instances of cancer scroti in persons who were not chimney-sweepers.² I have been informed by Mr. Fergusson that he lately excised an epithelial cancer from the scrotum of a man in King's College Hospital, who had never been exposed to contact with soot, but had worked much amongst guano for many years.

Cancer scroti is known to be a rare complaint, even amongst the class of persons peculiarly liable to it, and many hundreds have followed the occupation of chimney-sweeping for years, and even during the whole of their lives, without contracting this disease. We must therefore conceive the existence of individual predisposition as a condition necessary for its development. The soot does not appear to generate epithelial cancer, but by its continued contact to produce a state of skin favorable to the development of this disease—a state characterized by scabby patches and warty growths. I entirely agree in the view taken by Mr. Paget that the soot-warts are not primarily cancerous, “but are such parts as in certain persons are peculiarly apt to be the seat of cancer.”³ The cancer is the result of a subsequent change. Some soot-warts never become cancerous at all. Others, after remaining in a

¹ Pharmacologia, vol. ii, p. 89.

² Surgical Observations on Tumors, p. 328.

³ Lib. cit. vol. ii, p. 468.

stationary state for months or years, get hard and sore and become converted into a cancerous ulcer, and we may assume that at the period when this change takes place the epithelial cancer-cells were formed or invaded the part.

The disposition to cancer scroti appears in some instances to be hereditary. Mr. Earle extirpated the testicle and diseased integuments from a sweep, aged thirty-five, a patient in St. Bartholomew's Hospital, whose grandfather, father, and one brother had all perished from the effects of the disease.¹ A father and son were once in St. George's Hospital at the same time on account of it.² Mr. Cusack mentions that he removed a soot-wart from the hand of a female who carried on the business of chimney-sweeping, and that he had previously excised an excrescence of the same nature from the ear of her son.³

Cancer scroti occurs more commonly at the middle period than at any other time of life. In the majority of cases which I have met with, the disease occurred between the ages of thirty and forty. Those exposed, however, to the action of soot may become affected at a much earlier period. Mr. Wadd has figured a diseased prepuce and soot-wart on the scrotum from a boy aged fifteen; and Sir J. Earle witnessed a case of the disease as early as at eight years of age. It appears that the seeds of this malady are sown in early life, but in general do not germinate until they have remained for some time dormant in the system. What is the permanent effect on the scrotum produced by soot, which thus renders it in certain individuals so peculiarly susceptible of a cancerous action at some distant period, we cannot explain; but that the soot, though the exciting cause of the disease, may in some instances be a remote one, is shown by several striking facts. It is known that persons who have been sweeps when young, but have abandoned the occupation, have afterwards been attacked with chimney-sweeper's cancer, although they have long been removed from all contact with soot.—A sailor, between forty and fifty years of age, was admitted into the London Hospital, with an ulcerated sore on the scrotum, presenting all the characters of

¹ Med.-Chir. Trans. vol. xii, p. 305.

² Mr. Hawkins's Lectures on Tumors, London Medical Gazette, vol. xxi, p. 842.

³ Dublin Journal of Medical Science, vol. xxi, p. 137.

genuine chimney-sweeper's cancer. The inguinal glands were indurated and enlarged, and subsequently ulcerated. He had been brought up as a sweep; but for the last twenty-two years, during which period he had served at sea, he had not been employed amongst soot in any way whatever. The disease first appeared in the scrotum about three years before. In this instance, therefore, the influence of soot, if this were really the exciting cause of the disease, must have been exerted nineteen years before its appearance, during which long period the part was entirely exempt from the action of this substance. It has sometimes happened, after the morbid parts had been completely extirpated, and the wound healed, the patient having avoided further contact with soot, that the disease has reappeared, as it were afresh, a second and even a third time; not, however, in the cicatrix of the wound, but on a different part of the scrotum. These, and similar facts, lead to the conclusion that though abandonment of his occupation may render the adult chimney-sweeper less liable to cancer, it by no means forms a satisfactory security against its occurrence.

Cancer scroti chiefly extends its ravages by affecting the contiguous tissues, and has little disposition to contaminate the lymphatic glands or distant parts. An instance is on record of an old chimney-sweeper, who had been subject to this disease forty years, and had undergone three operations for its removal, yet even then the glands in the groin were unaffected.¹—A man, aged fifty-one, who had been a chimney-sweeper ever since the age of seven years, was a patient of mine on account of this disease. He had been repeatedly attacked with it during a period of twenty-two years, and had submitted to no less than five operations for its removal. The glands in one groin became affected only a few months previously. Ulceration took place, and the patient ultimately died from its irritative effects on the constitution, in a state of extreme emaciation. On a careful examination of the body, no trace of internal disease could be detected. The cancer was strictly limited to the scrotum and groin on one side. The late Mr. Bransby Cooper has likewise recorded a case of chimney-sweeper's cancer which ended fatally; and on examination none of the glands or viscera of the

¹ Mr. Hawkins's Lectures on Tumors, London Medical Gazette, vol. xxi, p. 842.

interior of the body were affected.¹ These cases show that the disease not only remains limited for a long period to the glands immediately connected with its primary seat, but in some instances, destroys life without extending beyond them, or implicating more distant parts.

Chimney-sweeper's cancer is a disease almost peculiar to this country. Dr. Warren, a surgeon of great experience in the United States, remarks that he has never seen it in chimney-sweepers in his country. Richerand² and other French writers inform us that it does not occur in France. Pit-coal, from which soot is produced, is only sparingly employed as fuel abroad; whilst in this country it is in almost universal use by all classes, and until recently our chimneys were cleansed by climbing-boys, who were consequently exposed from an early period of life to continued contact with soot. But these circumstances seem scarcely sufficient to account for the prevalence of epithelial cancer of the scrotum in England in comparison with other countries, without admitting the existence of a greater predisposition to the disease in the constitution of natives of this country. Mr. Russell states that it is rare at the Royal Infirmary in Edinburgh, and that he has seen but few cases of it.³ Mr. Syme makes a similar statement. Within my own recollection the complaint has become much less common than formerly, in the large hospitals of London, which I believe to be mainly owing to the general use of machinery in the cleansing of chimneys during the last twenty years.

Diagnosis.—I scarcely know of any disease for which chimney-sweeper's cancer in a state of ulceration could well be mistaken, the malignant character of the sore having been in all cases that I have witnessed very clearly marked. The warty excrescence which precedes the ulcerative stage bears some resemblance to the syphilitic warts, or to the growths termed mucous tubercles, which sometimes form on the scrotum; but the history of the case, and more

¹ London Medical Gazette, vol. xliii, p. 532. I examined the body of a man who died of diffuse inflammation arising from a large cancerous sore and abscess in the groin, consequent on epithelial cancer of the penis, for which the organ had been amputated two years previously. The lumbar glands and internal organs were all healthy.

² Nosographie Chirurgicale, tom. iv, p. 300.

³ Observations on the Testicle, p. 98.

especially the occupation of the patient, would always excite suspicion, and in most instances be sufficient to indicate the true nature of the disease.

Treatment.—Scrotal cancer is a disease quite beyond the control of topical and internal remedies. Time has been lost in attempts to eradicate it by arsenical and various other applications, but nothing hitherto tried has proved of any avail in arresting its destructive progress. There is, indeed, no effectual remedy but the knife; and fortunately this is a resource attended with a greater share of success than generally awaits operations on cancerous disease in other parts. When the scrotum is alone affected, the proceeding is very simple. The morbid parts are to be removed by two elliptical incisions, care being taken to cut wide of all disease; for if any part of the morbid tissue be left behind, the complaint will certainly reappear. The inguinal glands are so seldom contaminated at an early period of soot-cancer, that, as a practical rule, simple enlargement of them, which often arises from irritation, does not constitute an obstacle to the excision of the diseased scrotum.

After chimney-sweeper's cancer has to all appearance been effectually extirpated, and the wound has healed and remained so for some length of time, the disease has often been known to reappear; and, what is remarkable, it does not always return in, or in connection with, the cicatrix of the wound, as ordinarily occurs after operations for cancer in other situations, but is sometimes developed in a different part of the scrotum. Now, I believe, that in these cases the reappearance of the disease is not the result of previous contamination, or of imperfect removal of the morbid tissues, but that the cancer is generated altogether anew. The effect of the operation would seem to be the eradication of all existing disease, but unfortunately not to destroy the disposition to its development in the parts that remain; which may subsequently, therefore, become a fresh seat of cancerous action, especially if, as often happens, they continue exposed to its exciting cause—the soot. The surgeon should not, then, be guided in the treatment of these cases by the same principles which regulate his conduct in treating other forms of cancer, in which a repetition of the operation is seldom admissible, and rarely successful. On the contrary, if cancer appear, after excision, in a fresh part of the scrotum, it

must be met as if it were a local and a new disease, not the return of an old one; and a second operation may be undertaken on the same grounds, and nearly with the same hope of success, as in the first instance. I know, indeed, of several interesting examples in which life had evidently been greatly prolonged by repeated operations. At p. 415 I have related the case of a sweep, who, in the course of twenty-two years, had submitted to no less than five operations. Mr. Paget mentions the case of one in St. Bartholomew's Hospital with a small scrotal cancer, from whom one of the same kind was excised thirty years previously.¹ In another case in the same hospital, the diseased scrotum had been removed three times during a period of nineteen years.² I have recently seen, also, a sweep, aged sixty-six, whose finger had just been removed by Mr. Paget on account of well-marked cancer, and who had a cancer-wart on the opposite hand. A scrotal cancer was removed from this man thirty-five years before. The scar was quite sound, and there was no swelling of the inguinal glands. I know, too, of an instance in which, after the performance of a second operation, the patient lived for years, and ultimately died of another disease.

When the inguinal glands are hard and painful, and obviously carcinomatous, it has commonly been considered that no operation is advisable. But that such should be the rule of practice is clearly questionable. I have already shown (p. 415) that soot-cancer does not readily extend beyond the inguinal glands, or those nearest to the primary seat of disease. Under these circumstances, it is right to conclude, that the glands in the groin, when affected, may be excised with a fair hope of prolonging life, and with some prospect even of eradicating the disease. The operation has been performed in several instances. Mr. Liston, after excision of the diseased part of the scrotum, carefully dissected out several indurated glands in the groin, which were the seat of lancinating pains.³ In the case alluded to above, in which a cancer of the scrotum had been excised three times during nineteen years, Mr. Stanley afterwards removed some glands infiltrated with epithelial deposit from both groins. The wounds, though large, healed favorably. Mr. Paget has recorded an interesting example of primary epithelial cancer in the

¹ Lib. cit. vol. ii, p. 475.

² Medical Times and Gazette, vol. v, p. 415.

³ Lancet. 1840-1, p. 793.

lymphatic glands of a sweep, forty-eight years old. He had no appearance of cancer or wart of any kind on the scrotum or penis. The disease existed on both sides, and in the right groin ulceration had commenced. Mr. Paget removed all the glands that seemed diseased, and the wounds healed soundly. The operator lately informed me, that two years after the operation his patient was quite well, and apparently free from all cancerous disease.

When the inguinal glands are extensively ulcerated, or the cancerous disease has spread too far to admit of being effectually extirpated, there is nothing to be done but to endeavor to mitigate the patient's sufferings by opiates and anodyne applications, and to correct the irritating fetid discharge. Henbane and the salts of morphia may be given internally, and a lotion containing the chloride of lime and extract of opium applied to the sore; or it may be covered with a common poultice.

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